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MEMBER A.B.C. *The Only Paid Circulation in this Industry* MEMBER A.B.P.

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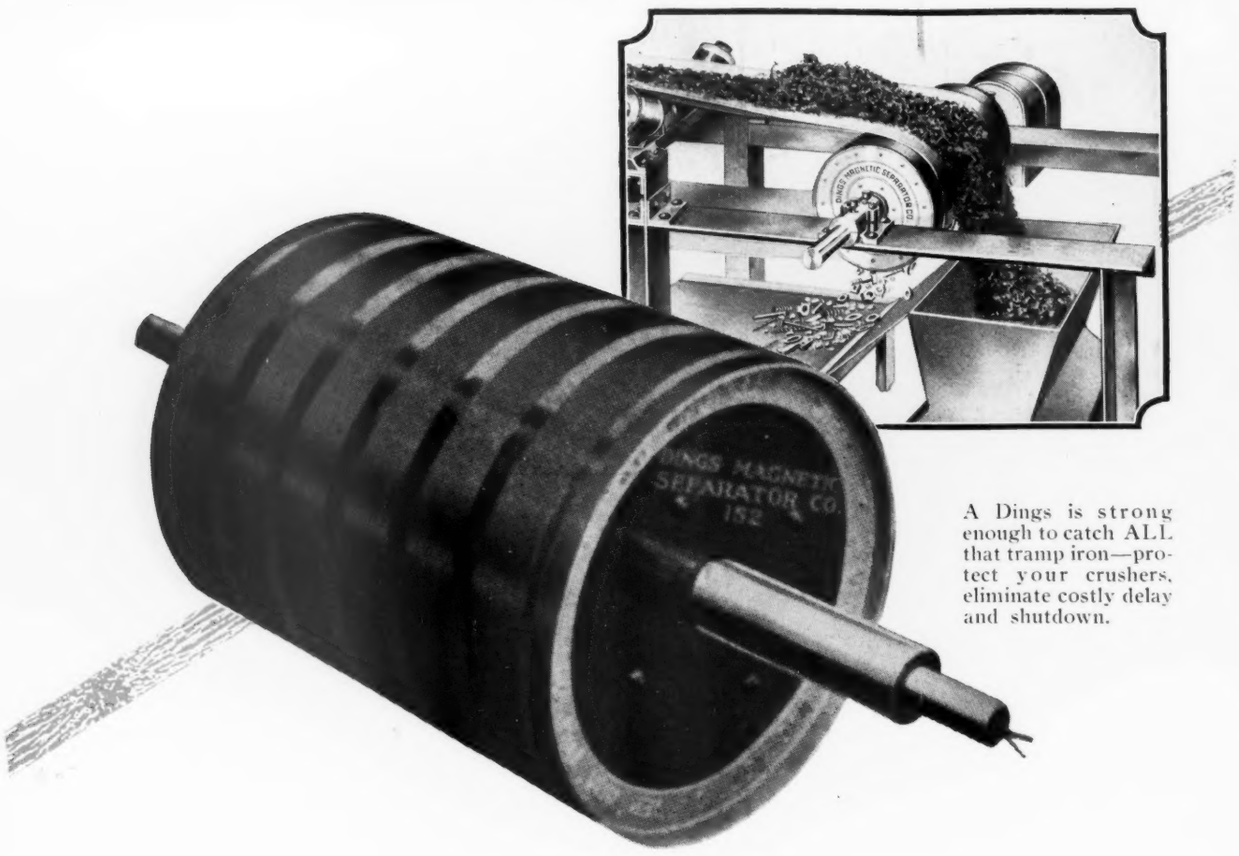

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Rock Products
With Which Is Incorporated CEMENT and ENGINEERING NEWS
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Vol. XXVIII | Chicago, October 31, 1925 | Number 22

Two Quarries Near Albany, New York

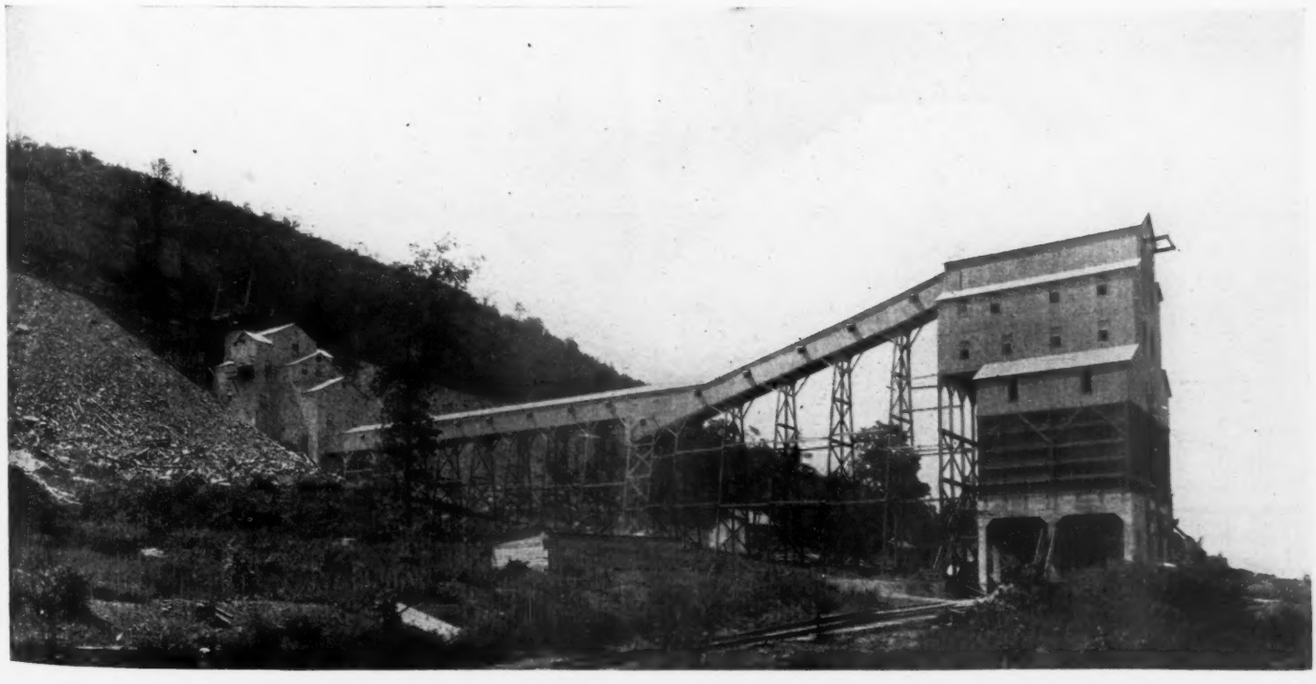
FRIDAY, September 25, the New York State Crushed Stone Association met at Albany, N. Y., and subsequently visited the quarries and plants of two local members —the Albany Crushed Stone Co. at Feura Bush and the Callanan Road Improvement Co. at South Bethlehem.

The plant of the Albany Crushed Stone Co. was briefly described in ROCK PRODUCTS of December 27, 1924. It is one of the largest and most notable crushing plants added to the industry during the past two years, and we are glad to take this occasion to describe and illustrate it in detail.

Albany Crushed Stone Company Operation

The Albany Crushed Stone Co.'s history and experience ought to prove interesting and helpful to others who believe the quarry game is highly profitable and easy to get into. Fortunately there is all kinds of money back of this enterprise to see it through. It

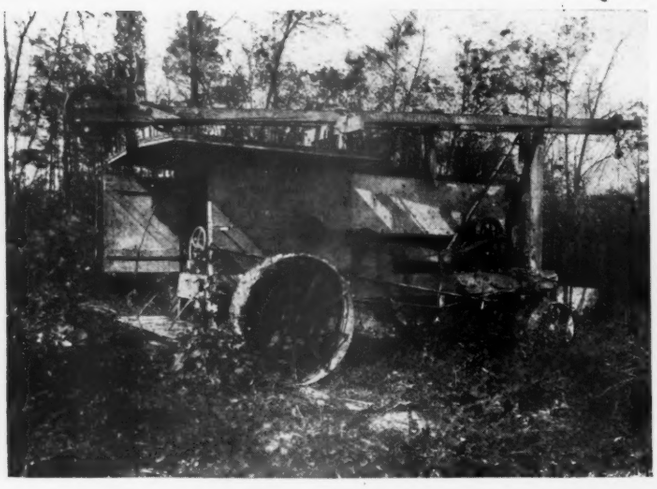
Group of New York State quarry men inspecting plant of the Albany Crushed Stone Co.



Plant of the Albany Crushed Stone Co. at Feura Bush, near Albany, N. Y.

Approximately the quarry floor level of the Albany Crushed Stone Co. operation

Discussing some of the problems of quarry operation at Feura Bush?



Large size electric traction well drill of the Feura Bush quarry operation

Electric shovel (92-ton) with 3 1/2-yd. bucket and crawler treads

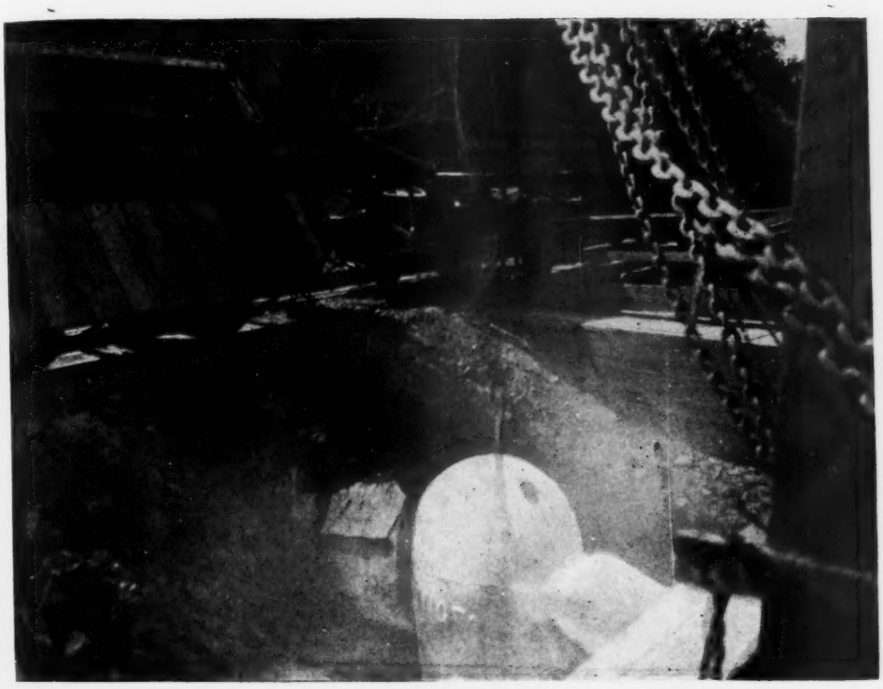
An early quarry view of the Feura Bush operation

A close-up following a blast—shale mixed with limestone

is said that of all of the directors are bankers and men of wealth.

The plant was designed to cost $200,000; already more than twice this amount is said to have been invested, and 12,000 to 15,000 tons is said to have been the biggest month's output. The plant is designed to produce about 4000 tons a day of 10 working hours.

Perhaps the most obvious lesson in this operation today is the glaring demonstration of the fact that a fine crushing plant and a fine ledge of rock do not make a profitable quarrying operation. As every experienced quarry operator knows the development of a quarry face to produce 4000 tons a day, regularly and efficiently, is no small problem, and is a matter of years of careful planning and working, not of months. The face thus developed is, or should be, one of the principal assets of a going quarry operation.



The initial 42-in. gyratory crusher at the Albany Crushed Stone Co. plant

The operation at Albany is furnishing an enlightening example of this. Probably at least $100,000 has been spent in developing a workable quarry face, and possibly at least as much more will have to be invested to get really profitable results. This, of course, does not take into account the loss due to non-production after the plant was ready to produce, but is somewhere near the actual cash capital outlay solely on quarry-face development and extension of quarry face.

The situation here was made particularly difficult by the proximity of the quarry face to be developed to the crushing plant, and to an error on the part of the designing engineers who misjudged the level of the quarry floor by nearly 30 ft. In other words, the level of the dump track into the primary breaker is nearly 30 ft. below the real plane separating the limestone which is to be quarried from the shale below it. This will necessitate raising the primary crusher, or some other expedient to provide for economical transportation of the stone in the quarry to the crusher.

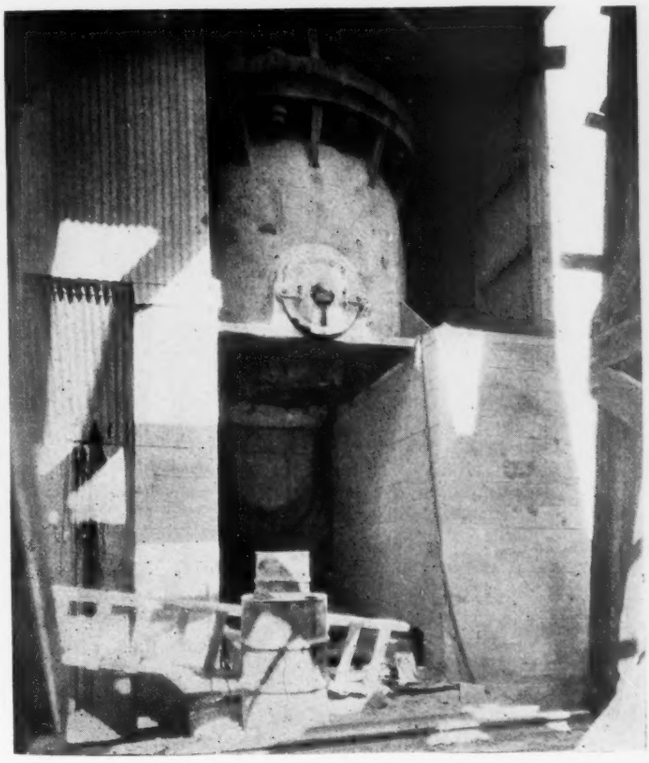
To further complicate matters the rock breaks into tremendously large chunks, so it is doubtful if any other quarry and crushing-plant operation has ever been faced with more serious difficulties in getting into a production stride, commensurate with its capacity.

The plant is very strategically located and apparently has every commercial factor in its favor. Engineering talent was freely consulted and the feasibility proved to the satisfaction of hard-headed bankers; yet, after over a year's operation the feasibility of profitable operation remains to be demonstrated, in the opinion of experienced quarry men, who ought to know.

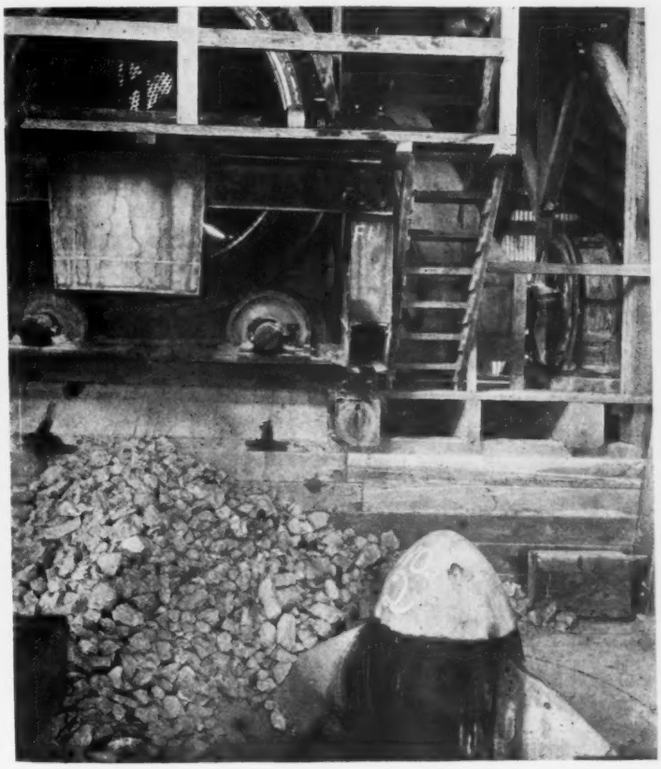
The limestone lies on the top of a bluff, and as already noted, on shale. The plant is a side-hill, gravity operation with very little elevating necessary. The bluff on which the operation is located overlooks the Hudson River valley and the new Selkirk classification yards of the New York Central railroad. Its siding is on the West Shore railroad.

A Model Electrical Operation

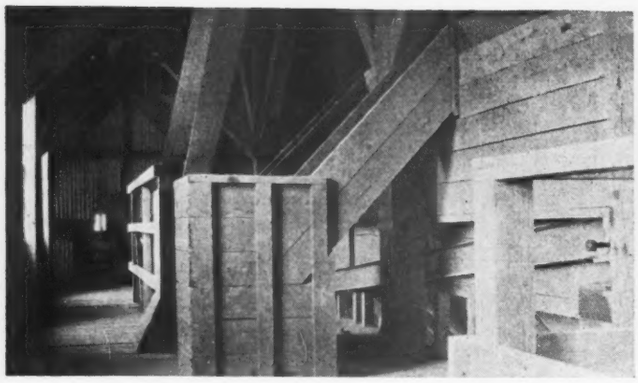
The operation is electrically powered throughout, with the exception of two Davenport steam locomotives and a Thew steam shovel used for stripping. For blast holing Loomis electric traction drills are used. A No. 92 Marion electric shovel does the excavating along the quarry face.



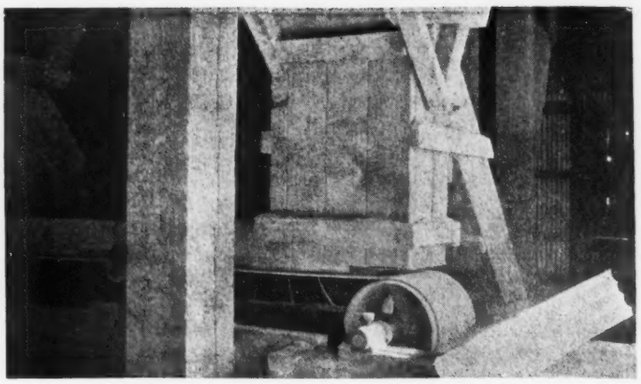
The 42-in. primary breaker from below, showing setting



The primary scalping screen discharging to pair of 16-in. crushers



Chutes for finished sizes of stone in screen house



Discharge ends of chutes to belt or storage bins

The initial crusher is a 42-in. Superior-McCully gyratory belt-driven by a 200-h.p. G.-E. slip-ring motor, using 440-v. 3-phase, 60-cycle alternating current. It was designed to be placed with its receiving hopper practically at quarry-floor level. Actually it is some 27 or 28 ft. below this level.

Passing the 42-in. crusher, set to about a 6-in. opening, the stone passes by gravity to a 72-in. x 16-ft. scalping screen which has 2½-in. ring perforations to remove at once the finished sizes of stone. A 20-h.p. slip-ring motor drives this screen by belt. The finished sizes are chuted directly to the 42-in. main belt conveyor between the crusher house and the screen house.

Rejections from the scalping screen drop from the end of the screen to two 16-in. Superior-McCully gyratory crushers, each belt-driven by 75-h.p. slip-ring motor. A secondary scalping screen, 72-in. x 20-ft., receives the products of these crushers and again the 2½-in. and under is removed direct to the main belt conveyor to the screen house.

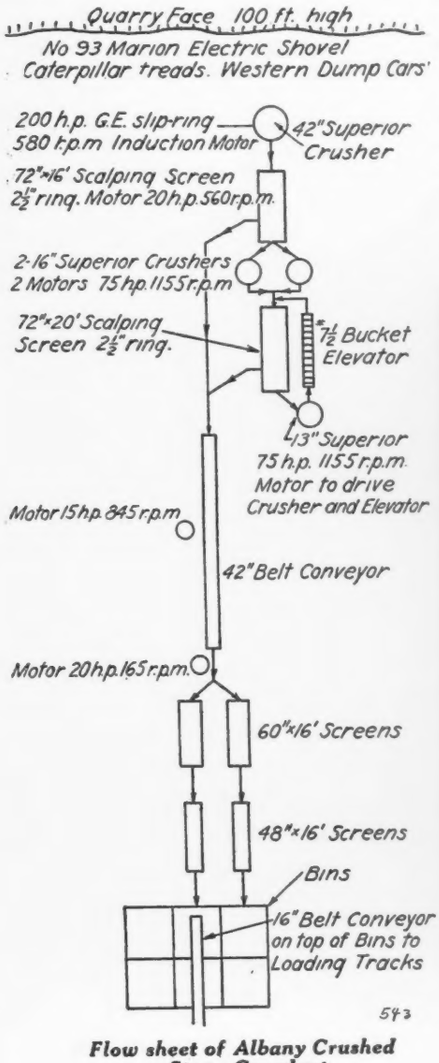
Rejections from the secondary scalping screen are discharged by gravity to a 13-in. Superior-McCully gyratory crusher, belt-driven by a 75-h.p. slip-ring motor, which also drives a belt-bucket elevator taking this crusher discharge back to the feed spout of the secondary scalping screen. This is the only elevator in the plant.

The product of all the crushers is received on a 42-in. belt conveyor 216-ft. centers, which takes it to the screen house over the bins. Here the stone is sized in two batteries of two revolving screens each, one battery 60-in. x 16-ft., and the other 48-in. x 16-ft.

Six bins receive the product with provision for changing the feed to the bins, or loading direct, by means of a 16-in. belt conveyor over the tops of the bins, tapping the various screen chutes.

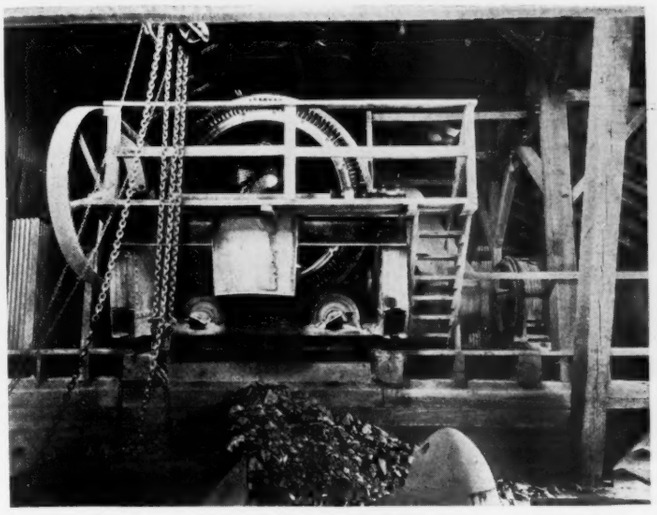
Electrical Equipment and Wiring Diagram

Power for operating the quarry and plant is supplied by the Municipal Gas and Electric Co. of Albany, N. Y., and the lines running to the plant are 55,000-volt, 3-phase, 60-cycle. At the point of the entrance to the company's property, there is installed a bank of 1000 k.v.a. transformers consisting

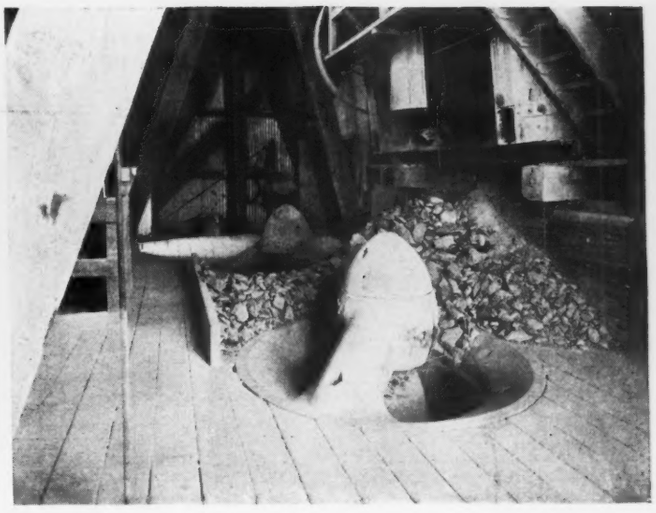


Flow sheet of Albany Crushed Stone Co. plant

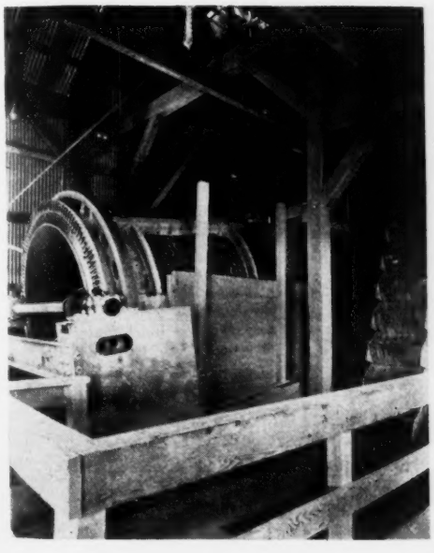
The 42-in. belt conveyor which connects the crushing plant with the screening plant, showing also the character of the building construction—corrugated sheathing on timber framework



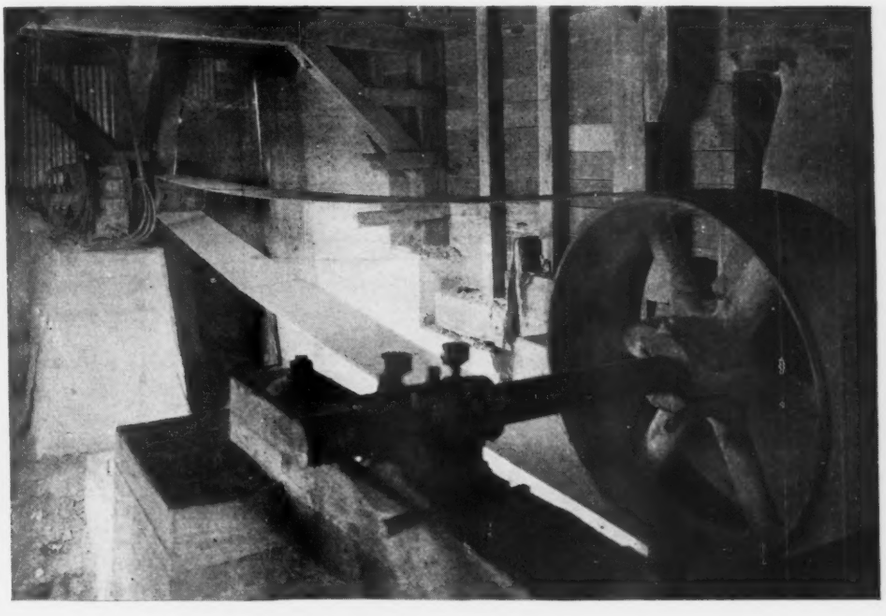
Another view of the primary scalping screen and 16-in. secondary crushers



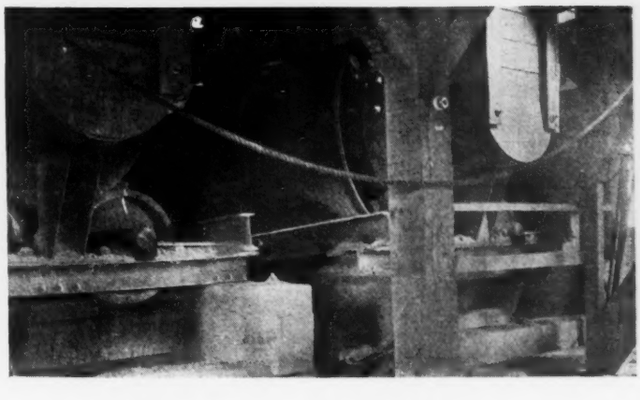
Secondary crushers with openings set at floor level of plant



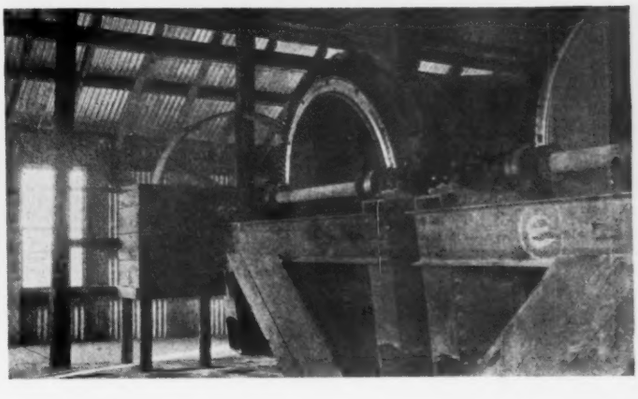
The secondary scalping screen and bucket elevator back to the scalping screen feed



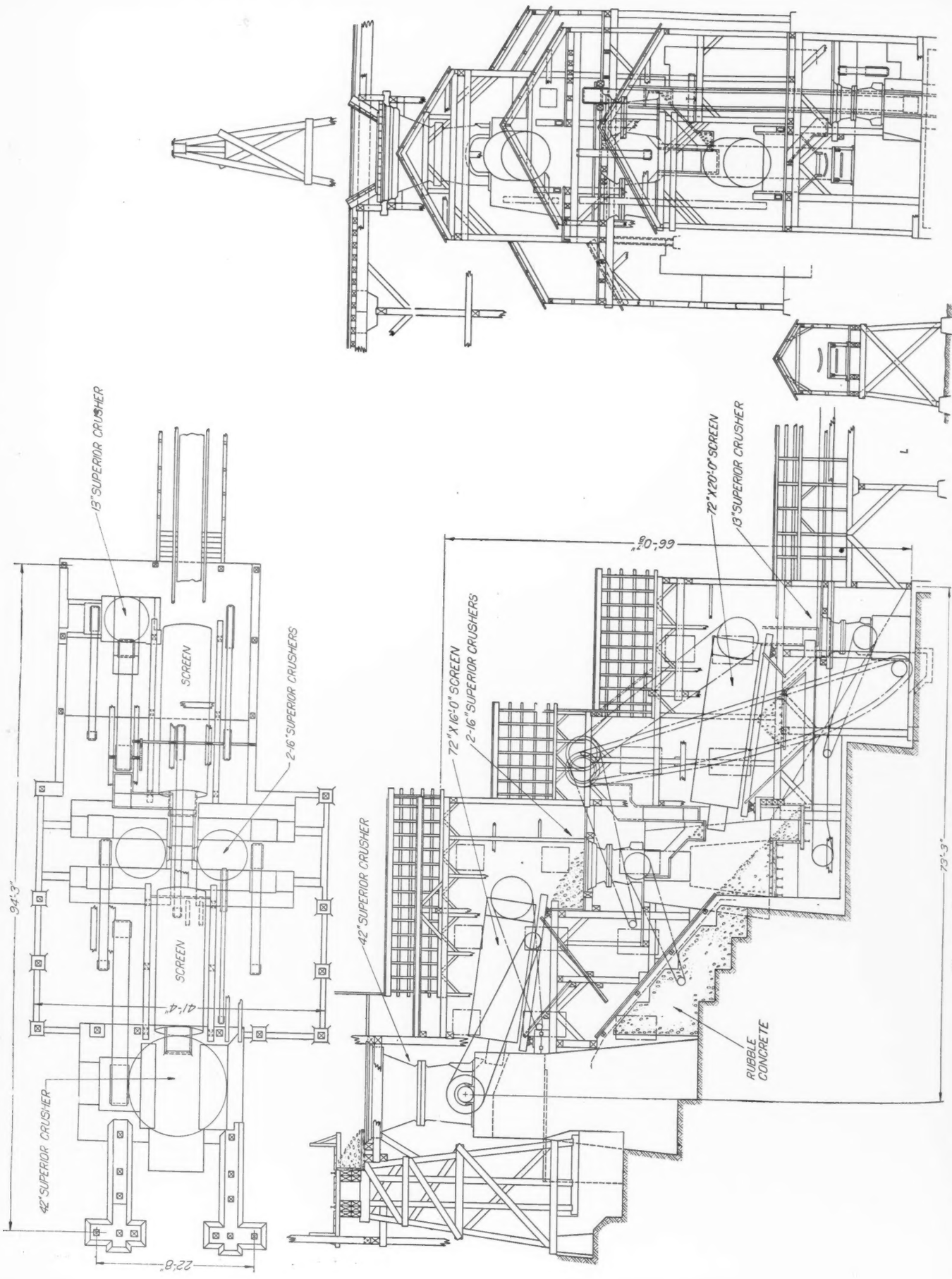
One of the 16-in. gyratory crusher belt drives—75 h.p. motors



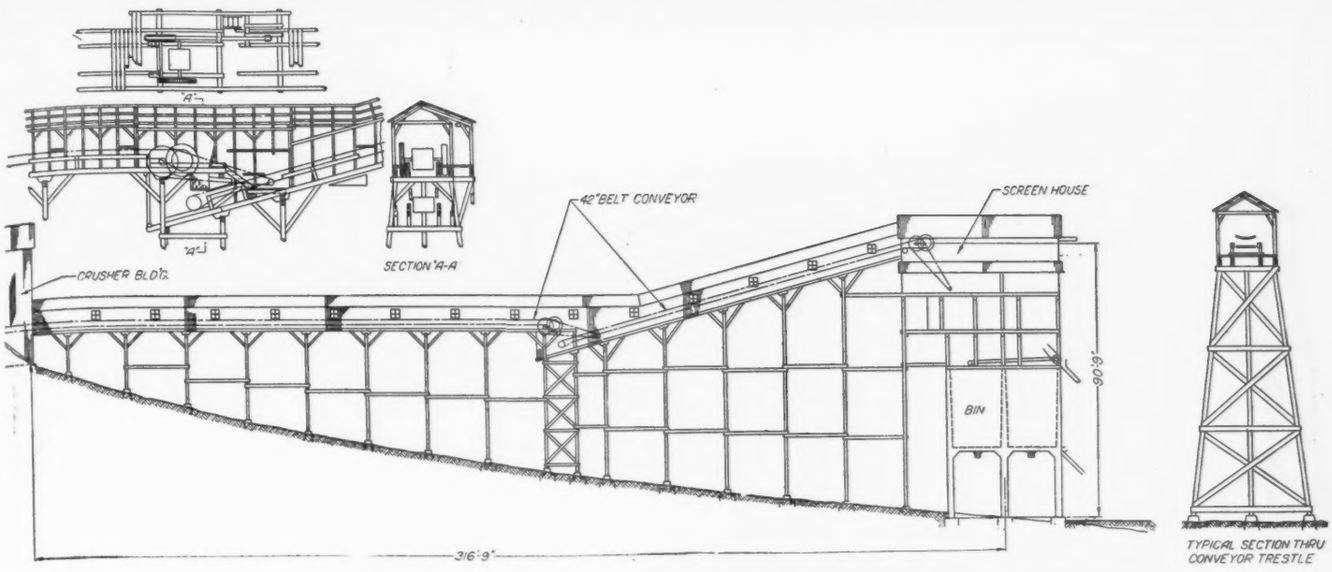
Feed ends of sizing screens in screen house over bins



Open-end sizing screens in screen house over bins



Plant and elevation of side-hill crushing plant of the Albany Crushed Stone Co.



Elevation and details of conveyor gallery and screen house

of three 333⅓ k.v.a. transformers. These transformers are of the outdoor type and transform the voltage from 55,000-volt to 2300-volt. The current is metered on the secondary side of the transformers, and the lines after leaving the low side of transformers, enter the switch house, in which there is installed an oil switch with overload and no-voltage protection, a demand meter and a watthour meter.

The 2300-volt lines leaving the switch house run to the crusher plant. On the way to the crusher plant there are the following taps:

(1) Tap for a 150-h.p., 2300-volt slip-ring type, air-compressor motor.

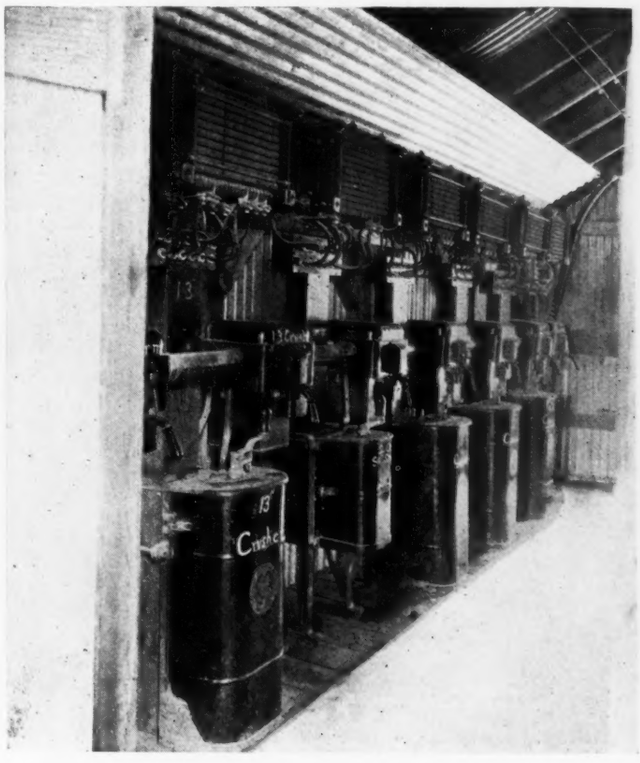
(1) Tap to 10-k.w., 2300-115/230-volt, 3-wire, lighting transformer.

(1) Tap to four 37½-k.w., 2300/440-volt transformer.

This bank of transformers is connected open delta on the high side with the primary of each bank of two transformers connected in series. This is a more or less temporary installation as transformers were used, which were obtainable in order to get 440-volts. These transformers supply current to the 50-h.p. cableway hoist, portable compressor for driving drills and to the portable blast hole drill.

(1) Tap through an oil switch to the electric shovel.

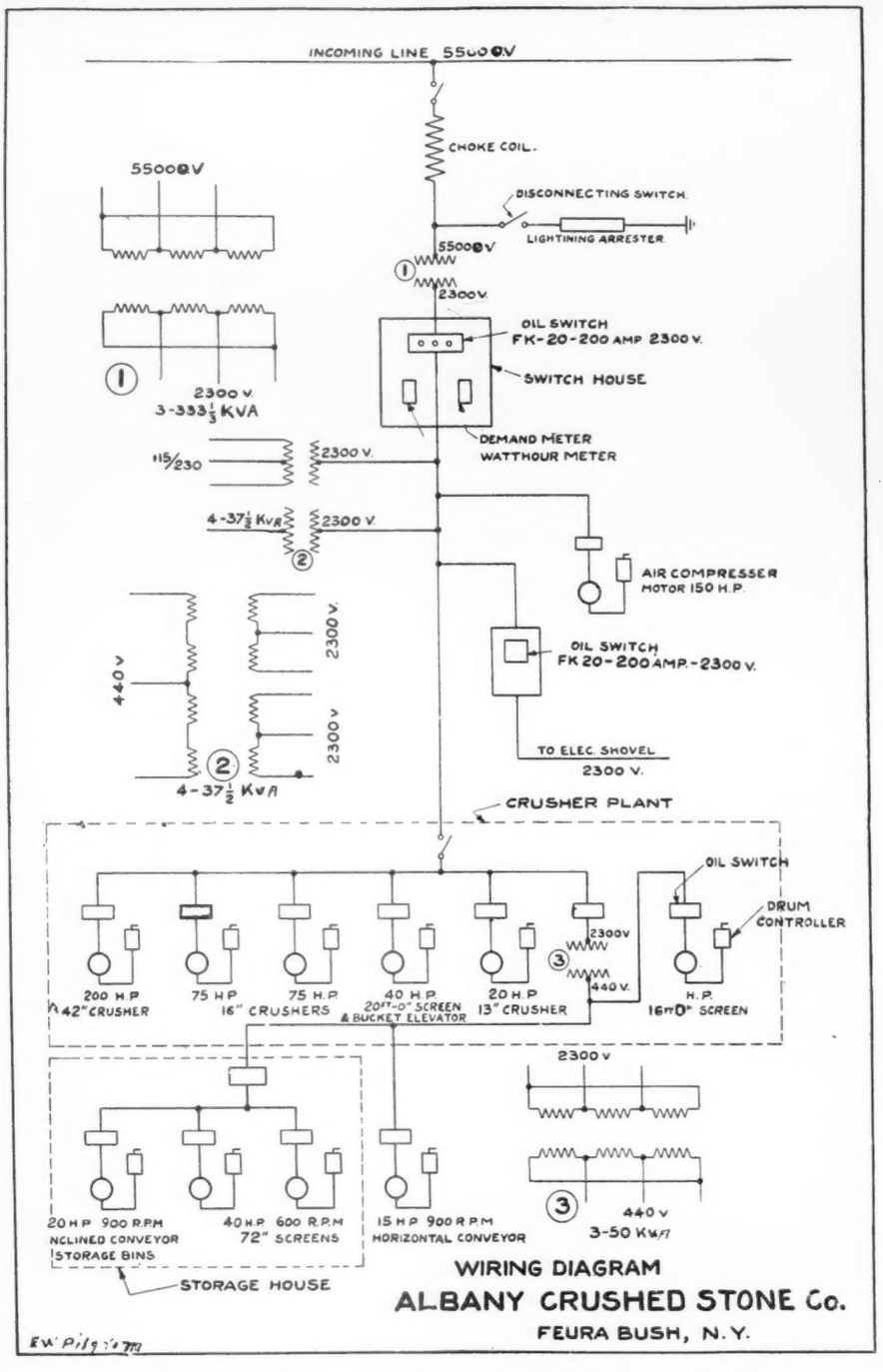
The 2300-volt lines in entering the crusher plant run in conduit to a control house shown in one of the views. Taps are taken off the line to an oil switch, drum controller and resistance for each motor in the crushing plant and in addition there is one tap to a bank of three 50-k.w. transformers installed on the outside of the crusher plant and supplying 440-volt for the conveyor motors and motors in the bin house. All



Controller room, containing control equipment for crusher and screen motors

Controllers for sizing screens in house over bins; right, 40-h.p. motor driving 72-in. by 28-ft. screen

Plant and elevation of side-hill crushing plant of the Albany Crushed Stone Co.



Electrical wiring diagram of the Albany Crushed Stone Co. operation

Outdoor substation, Albany Crushed Stone Co. plant

the motors in the plant are 3-phase, 60-cycle, slip-ring type, made by the General Electric Co. It should be noted that the arrangement of having all the controllers, oil switches and resistances grouped together in a room is an ideal arrangement as this part of the equipment is entirely protected from the dust and dirt.

J. Harris Loucks is president of the Albany Crushed Stone Co.; Lawrence Murray, vice-president; Newton V. Van Derzee, treasurer; Kenneth Creble, secretary.

Callanan Road Improvement Company Quarry

From the Feura Bush quarry the inspection party of New York state quarry men went to South Bethlehem, about a mile distant, to the quarry and crushing plant of the Callanan Road Improvement Co. This company derives its name from the fact that it goes back to the days when the principal business of a crushed-stone quarry was supplying material for road improvement—macadam roads. It has had a history of 40 years' continuous operation.

The quarry was started by Peter Callanan, father of J. R. Callanan, about the time the present West Shore railroad was built, that is in 1882. This railroad was the New York, West Shore and Buffalo, running from Wee-

Plant of the Callanan Road Improvement Co. at South Bethlehem, N. Y. Power plant at the right generates electric current with steam turbine unit for the whole plant

View of the Callanan quarry from the crushing plant

hawken, N. J., to Buffalo, N. Y.—later the West Shore, and now part of the New York Central System.

The first crusher was a No. 6 gyratory, made by the Power and Mining Machinery Co. and it was in operation over 30 years. A few years later a No. 7½ Gates gyratory was installed. In 1904, a No. 9 Power and Mining Machinery Co. was added, at that time this was the largest crusher made. This crusher is still giving service.

A Year's Output Then a Week's Now

When the quarry was opened it was thought that if 12,000 cu. yd. per year was produced it would be a very profitable investment. A few years ago the quarry was changed from hand operation to steam shovel and a 48x60-in. Worthington jaw crusher was added. The plant now has a production daily of 2000 to 2500 tons. There are five crushers, three Bucyrus steam shovels, the stone from the steam shovels being taken care of by four steam locomotives with six cars to a train.

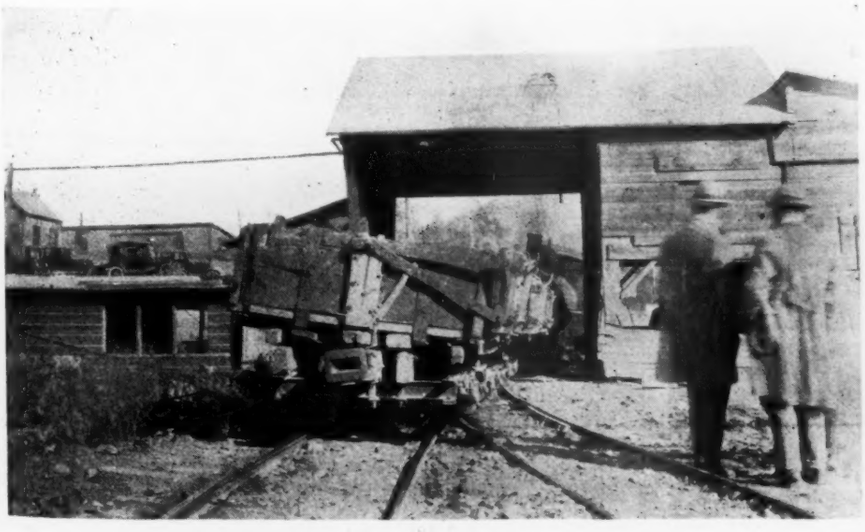
For storage a 25-ton Industrial crane is used and, also for switching cars one standard gauge steam locomotive is used.

The mill is now operated with electric power generated by a steam turbine in the company's own power plant.

Stone from this quarry has gone into the foundation of the beautiful New York State Education building at Albany, N. Y., the buildings of the General Electric Co. at Schenectady, also the buildings of the American Locomotive Co., at Schenectady. The approaches of the New York Central Railroad Co.'s new bridge spanning the Hudson River at Castleton, N. Y., as well as the new buildings erected in connection with the new yard at Selkirk and Feura Bush, N. Y., also contain stone from this quarry.

Personnel

The president of the Callanan Road Improvement Co. is H. E. Battin; the vice-president and purchasing agent, B. R. Babcock; secretary, Roland Kinnear, and the treasurer, H. C. Callanan.



Primary crushing unit of the Callanan crushing plant

Geological Survey to Retain Services of Research Specialists

THE following letter from George Otis Smith, director of the U. S. Geological Survey, explains the recent changes made in that department:

"As stated in my circular letter of June 17, the duty of gathering and publishing statistics on the mineral resources of the United States was given to the Bureau of Mines when that bureau was placed in the Department of Commerce. The transfer of this duty from the Geological Survey to the Bureau of Mines also involved transferring the employes of the division of mineral resources. However, a number of the specialists whose work on mineral resources has been well known in past years are remaining with the Geological Survey and discontinuing that particular phase of their work. As this change has seemed puzzling to some of their friends in the industry, I believe you may be interested to learn how it came about."

"The specialists referred to are members of the division of geology and carry on a substantial part of the field and research work of that division. Because of their familiarity with certain minerals in their geologic relations, and their consequent ability to interpret the statistics, these men have been called upon in the past for advisory and supervisory work in the preparation of statistical reports on mineral resources. For example, the geologist in charge of the section of iron and steel metals has supervised and prepared statistical reports on the production of cement and iron; another geologist has prepared the reports on lead, zinc, and cadmium; another those on slate, sand and gravel, stone, and lime. Such use of their time and energy, though at a certain sacrifice of research work, was believed justified by the value of their contributions in the field of statistics. However, the division of geology has first claim upon these men. Their retention in the Survey does not in any way reflect on the value of their work on mineral resources, but rather emphasizes the importance of their scientific research, from which they could ill be spared."

As to the Market for Chicken Grits!

A PROCESSION of chickens 100,000 miles long, laying enough eggs each year to reach from the earth to the moon and back, is something "Uncle Sam, the poultryman," can boast, according to the United States Department of Agriculture educational motion picture, "Four Hundred Million Chickens!" The film constitutes a "bird's-eye" view in one reel of the poultry industry in the United States, showing commercial, farm and back-yard chicken plants.

Lime—Its Use in the Treatment of Industrial Wastes

Preliminary Treatment Before Discharge into Sewers

By S. E. Coburn* and E. S. Chase**

THE spent waters from manufacturing processes are generally referred to as industrial, manufacturing or trade wastes. These spent waters carry large quantities of solids, in suspension, in colloidal form and in solution. These solids often bring about objectionable conditions in the bodies of water into which they are discharged. The objectionable conditions are varied and may consist of excessive discoloration and turbidity, putrefaction of organic matters with resultant offensive odors, deposits of foul muds and obstruction of stream channels, the stimulation of unsightly fungus and other growths, the destruction of fish and the rendering of streams and lakes unfit for domestic or industrial water supply. Wastes discharged into municipal sewers often bring about the clogging of these sewers and, in case of sewage treatment, render such treatment difficult and expensive.

Various states and municipalities have established laws and ordinances requiring manufacturers to treat industrial wastes before the discharge of the wastes into sewers or water courses. In such treatment lime is usually very important and in some cases it is essential. This article is a brief summary of the ways in which lime serves in the treatment of industrial wastes.

Wastes to Which Lime Treatment Is Applicable

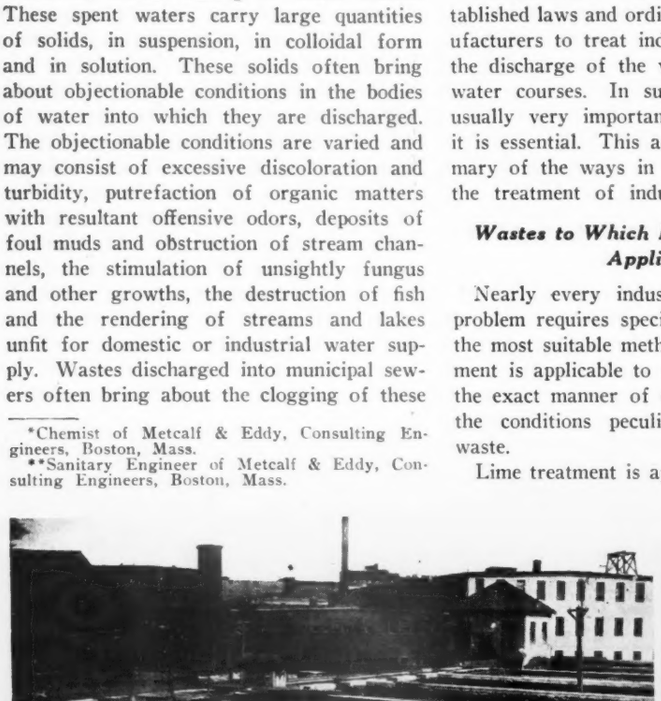
Nearly every industrial waste treatment problem requires special study to determine the most suitable method. While lime treatment is applicable to many kinds of wastes the exact manner of use is dependent upon the conditions peculiar to the individual waste.

Lime treatment is applicable to the wastes from tanneries, woolen mills, dye houses and other textile industries, paper mills, creameries and dairies, packing houses, canneries, starch factories and from numerous other industries.

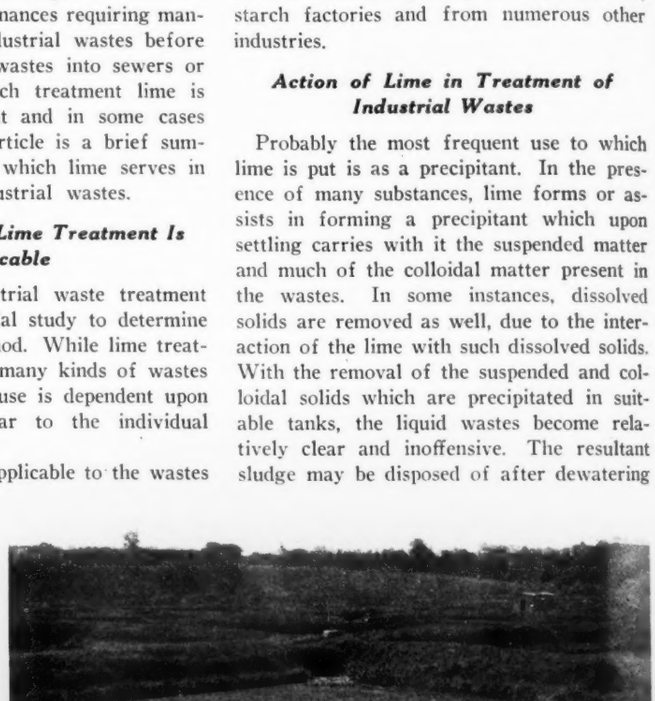
Action of Lime in Treatment of Industrial Wastes

Probably the most frequent use to which lime is put is as a precipitant. In the presence of many substances, lime forms or assists in forming a precipitant which upon settling carries with it the suspended matter and much of the colloidal matter present in the wastes. In some instances, dissolved solids are removed as well, due to the interaction of the lime with such dissolved solids. With the removal of the suspended and colloidal solids which are precipitated in suitable tanks, the liquid wastes become relatively clear and inoffensive. The resultant sludge may be disposed of after dewatering

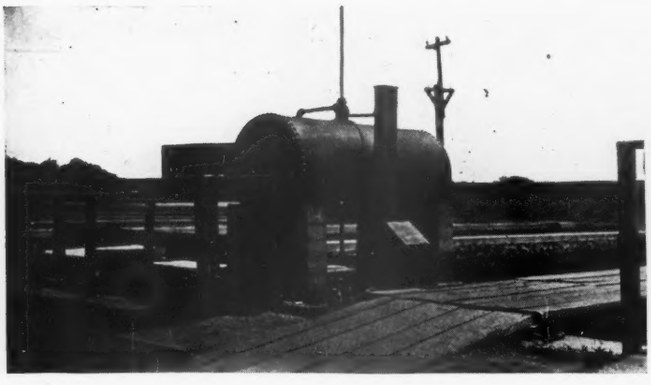
*Chemist of Metcalf & Eddy, Consulting Engineers, Boston, Mass.
**Sanitary Engineer of Metcalf & Eddy, Consulting Engineers, Boston, Mass.



Settling tanks for lime treatment of wastes



Intermittent sand filter beds



Hydrogen ion control apparatus

Tanks for cracking wool scouring liquor

on suitable drying beds as a low grade fertilizer or may be used for filling in low land.

Another use to which lime is applied is the neutralization of excessive acidity which occurs in many industrial wastes. Wastes of highly acid character if discharged without treatment into streams may bring about direct destruction of fish and if discharged into water high in carbonate of lime will bring about precipitation in the stream itself with resultant accumulation of sludge in stream channels. The neutralization of acidity is also essential at times where the wastes receive subsequent treatment by some form of biological purification.

A third way in which lime may be used in industrial wastes treatment is as a means for controlling the hydrogen-ion concentration (reaction) of the wastes so that more efficient precipitation may be brought about when other chemicals are used as precipitants in addition to the lime.

In the case of putrescible industrial wastes solid in their nature, lime is often used as a deodorant. It is also used to mix with industrial wastes sludge for purpose of rendering the sludge more easily dried by such means as filter presses.

Methods of Application

Lime is applied to the wastes in the form of milk of lime or in dry powder. When applied as milk of lime it is customary to slake the quick lime in a small amount of water and allow it to stand for a few hours. At the end of this time the slaked lime is mixed with about 20 times its weight of water and the resultant milk of lime is then applied to the wastes in the proper proportions. For applying the lime in the form of a dry powder, special apparatus has been devised and satisfactory types for this purpose are on the market. For dry feed, hydrated lime is used instead of quick lime. The apparatus for applying the lime in dry form is so designed and operated as to permit automatic application in proportion to the amount of wastes to be treated.

Examples of the Treatment of Wastes

The following specific instances illustrate the application of lime to the treatment of industrial wastes.

At a certain tannery in Massachusetts, the wastes are first settled in sedimentation tanks and then filtered through intermittent sand filter beds. At times the settled wastes are treated with alum and allowed to settle again prior to application to the filter beds. At other times settling and alum treatment alone are used. The extent of treatment depends upon the time of the year and the flow of the stream into which the effluent is discharged. These wastes are often too acid to treat with alum or to discharge upon the sand filter beds. At such times, milk of lime is added to the wastes until the optimum hydrogen-ion concentration is obtained for alum precipitation. This control of the hydrogen-ion concentration has resulted in a marked decrease in the amount of alum required and a marked increased in the rate of treatment upon the sand filter beds.

At a wool scouring plant in Rhode Island, the scouring liquor is treated by the Yorkshire or acid cracking process. The effluent from the treatment is consequently very acid and cannot be discharged into the neighboring stream without causing the destruction of fish life and other objectionable conditions. At this plant the excess acidity is neutralized by the addition of the proper amount of lime and it is possible to carry on the acid cracking process without having the effluent produce a detrimental effect upon the stream.

The wastes from dairies and milk handling establishments are usually very difficult to treat. It has been found in many cases that settling and liming these wastes prior to the susequent treatment result in the production of very satisfactory results.

It is probable that, with increasing standards of cleanliness for streams and other bodies of water, increasing attention will be devoted to the treatment of industrial wastes. Consequently a wider field of usefulness for lime here may well be developed.

Adhesion of Gypsum Plaster to Concrete

AT THE REQUEST of the committee on gypsum of the American Society for Testing Materials, two short experiments have been carried out in conjunction with a study of the linear expansion of gypsum. From the results obtained in some previous work a number of conclusions were drawn. One conclusion reached was that if a particular gypsum mix had an expansion approximating that of a particular concrete, under the same conditions, that gypsum mix might be expected to have good adhesion to the concrete. If, on the other hand, the particular gypsum mix behaved in great variance with the concrete, that gypsum mix would probably not give as good adhesion to the concrete.

The first experiment carried out was to test some of the brands of calcined gypsum and the concrete used in the previous work to see what loss of adhesion they would show when subjected to humidity changes. The method of testing was to make up six half briquets of a particular 1:3 cement mix, and after the cement had set, the other half of the mold was filled with the gypsum mix.

After the mortars had set the briquets were removed from the molds and allowed to dry in the laboratory for seven days. The strength of the bond between the cement and the gypsum was then tested, three briquets being broken in the usual manner. The remaining briquets made from the various samples of gypsum were placed under water for five hours and then allowed to dry in the laboratory for seven days. The strength of the bond between the gypsum and the cement in these briquets was then tested as before.

The results of these tests showed that the brands of gypsum which gave expansion curves similar to the concrete gave good adhesion to concrete and a small loss only in adhesion when subjected to humidity changes. The brands of gypsum giving expansion curves in great variance with the curve for concrete showed poor adhesion values.

The second experiment carried out was a study of the linear expansion changes of a concrete and of the coats of plaster as they were applied to the concrete. The method consisted in making up 2x4x12-in. specimens of 1:2:4 concrete. These specimens were fitted with two plugs made from capillary glass tubing, placed in the mortars 10 in. apart. Expansion readings were made from these plugs, using a 10-in. strain gauge. The concrete specimens were allowed to dry in the laboratory for 30 days, and then a ½-in. coat of a 1:2 gypsum sand mix was applied to the slabs. Short pieces of glass tubing were placed around the glass plugs in the concrete so that the expansion readings of the concrete were not affected. Another set of plugs was placed in the first coat before it set. Expansion readings were made hourly on the concrete for about 24 hours, after which a ½-in. second coat was applied, using a 1:3 gypsum-sand mix. Before the application of the second coat short pieces of glass tubing were placed around the plugs in the first coat in order to avoid affecting the expansion readings of the first coat. A third set of plugs was placed in the second coat before it had set. Expansion readings for both the concrete and the first coat were made hourly for about 24 hours. Then a thin white finish coat of lime and gauging plaster was applied, and expansion readings for the concrete and first and second coats were continued for 14 days. It was found that the concrete has a relatively great expansion when the first coat is applied, less expansion when the second coat is applied, and a very small expansion when the third coat is applied. The first coat has a relatively great expansion when the second coat is applied, but only a small expansion when the third coat is applied, while the second coat shows only a small expansion when the third coat is applied.—*Technical News Bulletin*, U. S. Bureau of Standards.

Mining of Limestone

LIMESTONE, which finds industrial use in the United States to the extent of approximately 120,000,000 tons per year, is obtained chiefly from open-pit quarries, but with gradual depletion of surface deposits, more and more operators are being forced to use underground methods. As quarrymen are not necessarily familiar with underground mining, a complete study of the mining of limestone in this manner has been made by engineers of the Bureau of Mines, Department of Commerce, with the object of determining the methods in use, ascertaining what constitutes good and bad practice, and suggesting improvements in methods when practicable. As a result, complete data were obtained, with the hearty co-operation of the industry, on 52 of the 64 mines known to have underground workings.

The Sand and Gravel Industry of the West Coast

Some General Observations on Operations from Seattle, Washington, to Los Angeles, California

By Edmund Shaw
Editor, Rock Products

ONE is bound to find differences in sand and gravel plants, as no two deposits are alike. You cannot put a dredge to work on top of a hill or use a steam shovel to dig gravel under water. But in the east and south and the Mississippi valley the plants classify themselves fairly well. On the West Coast a good many of them refuse to be classified. This is partly due to the adoption of methods from gold mining and partly to the spirit of the west, which is always looking around for new and better ways of doing things and is willing to try anything once.

Sluicing or hydraulicking is a fairly common method everywhere, but it is perhaps the preferred method in the deposits near Seattle. The deposits favor it, as they are very high. I visited one (that of the Heney Gravel Co. on Vashon Island, about 20 miles from Seattle) which rises 360 ft. above the water of the bay and a clear 300 ft. above the top of the washing plant and bins. The sluices through which the material flows to the plant are carried on a 12½% grade, which is rather steep but necessary to keep the sluices from choking with the larger stones that would otherwise drag on the bottom. One can figure that it will be a long day before sluicing will have to be abandoned. A 12½% grade is a rise of 1 ft. for 8 ft. of distance, hence the ends of the sluices would be 2400 ft. away from the plant by the time they reached the top of the bank. The tonnage available in the area to be covered runs into the billions and no known plant production would exhaust it in a lifetime. Under such circumstances sluicing would be the method to adopt if it were shown to be as cheap as any other.

The deposit of the Pioneer Sand and Gravel Co. at Steilacoom, Wash., was formerly worked by hydraulicking, but the greater part of the excavating is now done by a 65-ton Thew steam shovel. The bank is 160 ft. high and a certain amount of sluicing has to be done to protect the shovel from caving and sliding ground. But this sluicing is very simple. A pipe on top of the bank allows a stream of water to flow down without any force and this cuts the bank enough to keep it sliding just as the rills that follow a rain storm would cut it. The effect is to keep the face of the bank near the angle of repose, and hence to obviate caving.

The material, whether from the steam shovel or by sluicing, is drawn to the top of the bank by hoists before being sent through the plant and the hoisting system is very well worked out. The hoist that pulls the dirt from the steam shovel is a large double-drum hoist made by the Washington Iron Works of Seattle and operated by a man at the levers in the ordinary way, but there are two other hoists of the "automatic" type which run without any operator. They were made by the Wellman-Seaver-Morgan Co. and they should really be called "remote control" hoists, as the starting and stopping is from a switch at the bottom of the incline. It is rather fascinating to stand in the hoist house and watch the drums start, stop and reverse, and to see the contacts snap in as the speed is built up, all without any human agency.

The screening methods at the plants mentioned, the Heney and the Pioneer plants, are as unique as the excavating operations. At the Heney plant a bumping screen is used which was designed by Mr. Heney. It is a flat screen set at 45 deg. and the material flows over it as it would over a gravity screen. About 10 or 12 times a minute the screen, which hangs by rods in a frame, is given a push by a cam and moves forward. As it returns to place it strikes a timber

Steilacoom, Wash., sand and gravel deposit of the Pioneer Sand and Gravel Co., Seattle

Plant of the Pioneer Sand and Gravel Co. at Steilacoom, Wash.

Heney Gravel Co. plant, Seattle, Wash.

A gravel bank 300 ft. high—Heney Gravel Co.

Unloading crane of the Columbia Digger Co., Portland, Ore.

Crushed stone unloading plant of the Columbia Contract Co., Portland, Ore.

with a jar that loosens any pebbles that may be sticking in the meshes and sends any material that may be hanging up, sliding down the screen.

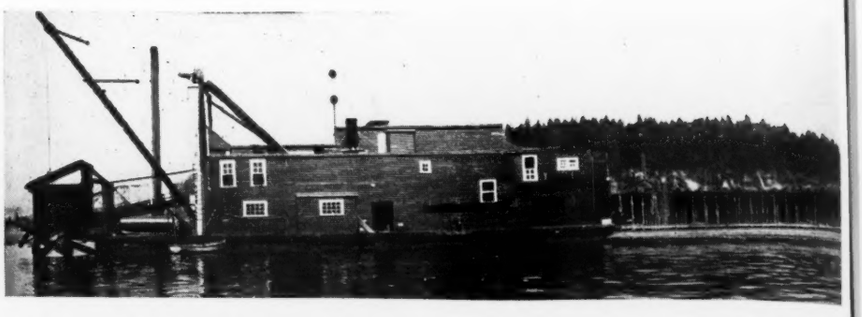
At the Pioneer plant at Steilacoom the screen system is quite different from anything I have seen or heard of. The material is taken from the bin by a stream of water which is shot into the gate. It flows down a sluiceway in the bottom of which is a screen that takes out some of the water and most of the sand and then through a revolving grizzly that takes out the oversize for crushing. The undersize goes down a rather steep sluice (2½ in. to the foot) and is thrown against a deflector plate that throws it up against a screen set at 45 deg., which takes out the remaining sand. The oversize from this screen falls on a pair of plates like a hip roof, which splits it and sends it over ordinary screens that separate it into sizes. The system works well, for the product passes the most rigid specifications, including those of the highway department.

The Pioneer deposit is among the best I have seen in journeys which have covered a considerable part of the United States. It is of gracial gravel (from the Nisqually glacier) and contains only hard pebbles, most of them from fine grained igneous rocks. In addition to the quality, the quantity of sand and gravel is about right to supply the demands of the market for each. The only waste is in some fine gravel, around ½-in. in size, and it is expected to utilize this soon in markets to be developed.

There are four companies which do the greater part of the business in Seattle, the Phillips Sand and Gravel Co., the Sound Sand and Gravel Co., the State Sand and Gravel Co. and the Pioneer company, the work of which has just been described. The Pioneer is the largest, producing 100,000 tons a month at its Steilacoom plant alone during the building season. It has seven bunkers or delivery bins placed along the water front for all the gravel is brought into the city by barges. The president of the company, H. F. Ostrander is at the head of a number of enterprises in Seattle.

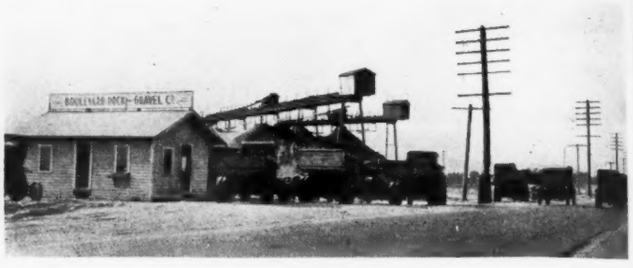
Sand and gravel are not often imported or exported but in the northwest corner of Washington a considerable part of that used

Plant of the Rhodes-Jameson Co., Pleasanton, Calif.

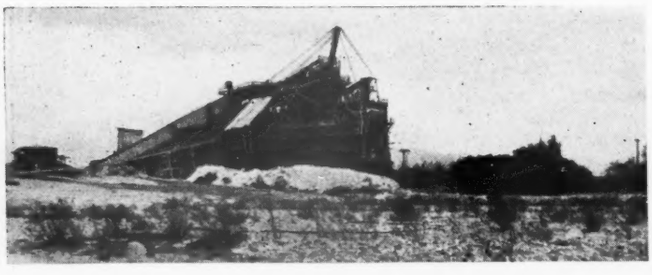


Dredge of the Willamette Gravel Co., Portland, Ore., typical of the Columbia and Willamette river type of dredge

Storage plant of the Boulevard Rock and Gravel Co., Los Angeles, Calif.

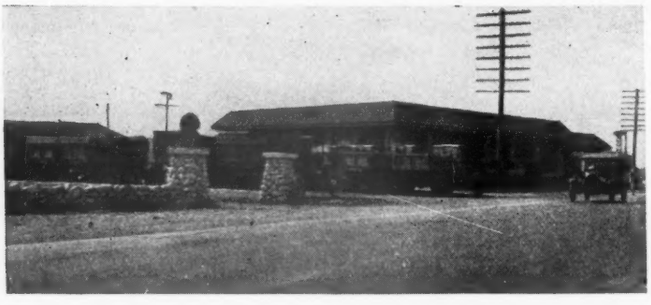


Office and loading plant of the Boulevard Rock and Gravel Co.



Big Tejunga Rock and Gravel Co. plant, Los Angeles, Calif.

Consumers Rock and Gravel Co. plant, Los Angeles, Calif.



Office and part of truck fleet of Harris and Hall, Los Angeles

Roscoe Sand and Gravel Co. plant near Los Angeles

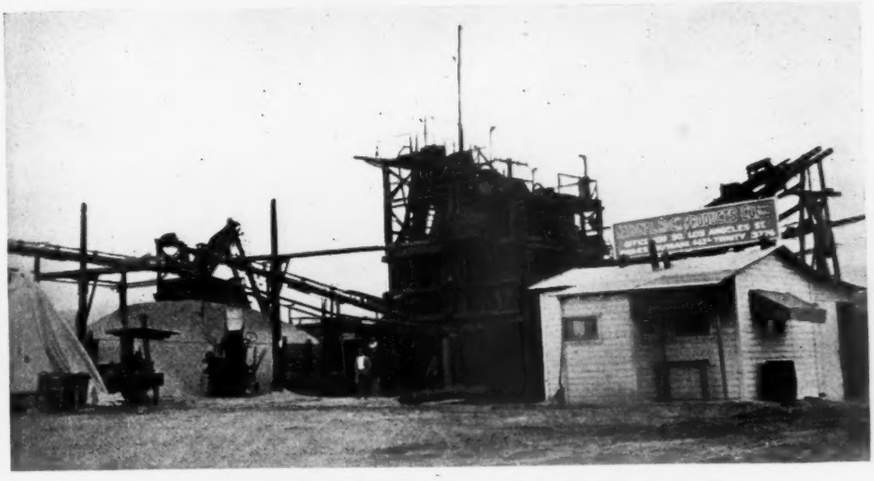
comes from the Rock Gravel Co. of Victoria, B. C.

At Portland I found that practically all the sand and gravel used come from the Columbia and Willamette rivers and that about 75% of it comes from the companies organized and managed by H. F. Puariea. These are the Portland Gravel Co. and the Willamette Gravel Co. which dredge the Willamette with clamshell dredges for gravel and the Columbia Sand Co. which operates a suction dredge on the Columbia. The product is sold to dealers who retail it from yards along the river.

I saw the new dredge of the Portland Gravel Co. which is a clamshell dredge of an unusually good design. The power plant consists of a 200-h.p. Fairbanks-Morse full Diesel engine and a 7½-h.p. auxiliary oil engine for pumping and running a small air compressor for starting. The main engine has a water muffler and is almost noiseless. The screen has Allis-Chalmers ends and bearing but the sections were designed by Mr. Puariea who experimented and found a way to punch plates that give a screen of 15% more efficiency than the ordinary type. The hoists with all the clutches, transmissions and the like were especially designed for this boat and built by the Hesse-Ersted Iron Works of Portland, and the conveying machinery was furnished by the Stephens-Adamson Manufacturing Co. A 2½-yd. Stockton bucket digs the gravel.

The main reason for choosing this type of dredge is that the river is very deep and

Coast Rock and Gravel Co. plant near Pleasanton, Calif.



National Rock Products Co. plant near Los Angeles, Calif.

much of the gravel has to be dug 120 ft. below water level. There is very little sand with it and what there is is not saved, for Columbia river sand is considered much better. In fact there is a city ordinance that forbids the use of any but Columbia river sand on municipal work.

Mr. Puariea is a young man but he has had a lot of experience in the aggregate business, not only sand and gravel but crushed rock, for he was at one time in charge of the St. Helens quarries near Portland. And he has succeeded in convincing the largest retailing companies that he could produce sand and gravel on a large scale and sell it to them at their docks cheaper than they could produce it and transport it for themselves. This is because he can keep all his equipment, not only dredges but barges and tugboats, busy all the time, which the other companies could not do except in the peak of the season.

There is no competition from crushed stone in Seattle, but there is considerable of it in Portland. The Star Sand Co. has crushed a lot of rock for the 360,000 yd. of concrete that has made Longview, Wash., famous, although the greater part of the aggregate used there was gravel, and it ships a good deal to Portland. The plant is at Coffin Rock. Warren Bros. have a quarry near Portland primarily to furnish aggregate for "Warrenite" roads, but much of the product is sold for other purposes. The Columbia Contract Co. operates a quarry at St. Helens, Ore., and ships a good part of its product to Portland.

At San Francisco

The most surprising thing I found in the aggregate industry in San Francisco was that gravel sells there for 25c more per yard than crushed rock. It was explained to me that this was not because the purchasers were particularly partial to gravel; but that the difference in price was made to place the two on equal terms. Sales were made by the yard but the cost of freight, handling and storing had to be paid by the ton. As the gravel weighed something over 300 lb. more to the yard the extra price was to cover the extra weight of the material. The prices, not at the plant, but at the bunkers, as the delivery yards are called here, are at present $2.00 and $2.25 for stone and gravel, respectively.

Most of the producing companies produce both stone and gravel. A great deal of the stone is crushed boulders from the tailings of gold dredging operations. These are very hard, being mainly of andesite and other igneous rocks. But the Coast Rock and Gravel Co. operates a plant at Fresno which crushes an unusually hard serpentine. This is the same rock which as building stone is

New plant of the Reliance Rock and Gravel Co., near Los Angeles, Calif.

known as *verde antique*, and it makes an excellent aggregate.

I visited one of the Coast Rock and Gravel Co.'s plants (it has seven in all) near Pleasanton. The operating manager of the company is A. F. Hadsel, who is widely known in the western states as the inventor of a cableway dragline system. One of these is used at the plant near Pleasanton and it has a 4-yd. bucket. This is said to be the largest cableway installation in the state although at one time a 5-yd. bucket was in operation. The washing plant contains a number of Mr. Hadsel's inventions among which are a shaking screen so balanced that it does not shake the building and a sand recovering device which is a wheel with buckets that excavate the settled sand.

Near to this plant the Rhodes-Jamieson Co. of San Francisco is building a new plant. This is unusual for this locality as it will use a suction dredge for excavating. Work on the hull has just begun but the washing plant is well along in construction. The pump is a 12-in. American Manganese Steel Co.'s dredging pump and it will be driven by electric power. The discharge will go to a dewatering screen which will take out the sand, made by the Bodington Mfg. Co. of San Francisco, and the sand will be pumped to sand settlers while the gravel will be raised by a bucket and belt elevator to the washing plant. This will contain Link-Belt conical screens for separating the gravel. They are being mounted in a frame of structural steel and this is placed on ten concrete silos which will be used as storage bins. This company operates dredges on the Sacramento river and at Napa.

The Niles Sand Gravel and Rock Co. of San Francisco is shortly to build a new plant and the drawings for it have just been completed by J. C. Buckbee and Co. of Chicago. This company has plants at Niles and Rock River and the new plant will be at Coyote. The material will be dug by Lidgerwood and Bucyrus dragline excavators with 2-yd. buckets and the plant will consist of two units, one for producing gravel, the other for producing crushed rock. All pieces over 4-in. in size will be sent to the rock crushing unit.

William H. Ford, the president of the Niles company admitted that this was the best year the company had had, and Mr. Erlin of the Coast Rock and Gravel Co. said that business had been very satisfactory. Actual building report figures show about 10% increase this year over last for San Francisco and the surrounding towns. Some other places show large increases, Fresno, for example, which showed a 129% increase this year over last year.

Los Angeles Has a Sand War

In Los Angeles the year started badly for the industry with a lower demand than in 1923 and 1924 and a "sand war" raging. Prices fell below cost of production. Fortunately the producers came to their senses before the fight resulted in the extinction of any important producer. The demand increased and the price has been steadily rising.

Anyone who would look over such tracts as the Big Tejunga wash and the San Gabriel wash would say that the plants in sight would supply the market and more. This was the case two years ago when ROCK PRODUCTS' managing editor visited the field and wrote of the industry. But since that time several new plants have been built or are being built at this writing.

The largest plant of the new ones is that of the Reliance Rock and Gravel Co. It has a daily production of 6000 tons in 10 hr. and this is said to be as much as any plant in the district produces. It is in the San Gabriel wash near Azusa. The ground which is a mixture of boulders, gravel and sand has been drilled to almost 400 ft. and found to be of the same character all the way. It is worked by two 80-B Bucyrus steam shovels and the present face is 89 ft. deep. It is primarily a rock crushing plant, as boulders form so large a part of the deposit, which is commonly the case with the plants around Los Angeles. One No. 15 and two No. 6's (type N) Allis-Chalmers crushers and four No. 6 McCully's are used. The screening plant is in two sections, one in which the gravel and sand below 2-in. are washed and screened wet and the other a dry screening plant for the crushed rock. This has a battery of 22 Hum-mer screens of the new 332 type. The gravel is washed in Allis-Chalmers conical screens. Sand recovery is by the sand wheels of A. F. Hadsel, mentioned above.

A feature of this operation is the hoisting of the bank run to the plant by a 50-ton car on an incline, a much larger unit than is ordinarily used for such work. It makes a round trip every two minutes and is so regular that one might check his watch by it.

In going to this plant the plant of the Estes Canyon Rock and Gravel Co. was passed. This is near Pasadena and a considerable part of the present output goes into "Stonetile." A No. 10 gyratory crusher was being installed and other improvements were being made.

Gravel Price War in California

EXISTENCE of a price cutting war among gravel men was brought sharply to the attention of the board of supervisors of Fresno County, Calif., when it purchased 4500 tons of 2-in.-to-sand gravel on a bid of $4200.

The highest bid was $1.80 a ton, while the lowest averaged less than 95 cents a ton, the gravel being bought for delivery at Dos Palos and Mendota. The contract was awarded the Grant Rock and Gravel Co. of Fresno, Calif.

Of the gravel bought, 1500 tons go to Dos Palos and the delivery price is $1 a ton, while 3000 tons go to Mendota where the price is 90 cents a ton.

Freight to Dos Palos is 80 cents a ton, to Mendota, 70 cents a ton.

Board members declared that these are the lowest bids it ever received for gravel and indicates that there is keen competition in the business. The bids indicate, the board said, that only a small margin of profit is allowed by the contractors.—*Fresno (Calif.) Republican.*

Portland Asked to Indorse Private Central Mixing Plant

A PROPOSITION which has been placed before Commission Barbur of the department of public works and City Engineer Laurgaard for consideration is that of the city of Portland, Ore., giving its indorsement to the establishment by private parties of a central mixing plant for cement to be used in building construction and other improvement and development work.

George A. McDonald, No. 521 Railway Exchange building, is fostering the new project, and he has submitted to Commissioner Barbur a considerable amount of data from other cities, particularly Los Angeles, where central mixing plants are in use.

It is pointed out that by use of a central plant the mix would be uniform in quality and home owners would avoid considerable rubbish at their places when cement work is necessary, as the mixture would be delivered the same as other materials ready for use.

While Commission Barbur is inclined to favor the idea, he does not believe that any action on the part of the city council is necessary, unless the plant should be used by contractors on street work. In such case it would be necessary to place a city inspector at the plant. In no case, says Barbur, would use of the central mixing plant be made compulsory and it would have to build up a clientele solely on the basis of advantages to be gained by its service rather than having cement mixed at the building locations. —*Portland (Ore.) Journal.*

Deformation of Molding Sands

EXPERIMENTS to devise a method for running softening temperature determinations on molding sands have been conducted by the Bureau of Mines, Department of Commerce, at the request of the committee on molding sands of the American Foundrymen's Association. Experiments have been completed and a report to the committee is being prepared for its guidance in formulating the conditions under which molding sands should be tested for refractoriness. In this work it has been necessary to determine first the effect of furnace atmospheres on the raw sand, the washed sand, and the bond used in forming the sand into molds. Six typical sands were selected and these were tested under both oxidizing and reducing conditions. The softening range of the sand was determined by cones and test bars.

Modern New Jersey Molding Sand Plant of George F. Pettinos

Different Pits Operated for Special Sands

THERE is no better illustration of the way in which rock products industries are developing than the molding sand operation of George F. Pettinos, near Millville, N. J. Like almost all molding sand operations, up to a comparatively short time ago it was a pick and shovel operation with horses and dump cars for transportation. Today it is as well equipped with material-handling and excavating machinery as any plant in the country of equal or anything like equal tonnage.

The plant in its present shape was completed in the spring of this year although digging and material handling equipment has been added from time to time during a longer period. The last horse and dump cart went out of service a little over a year ago.

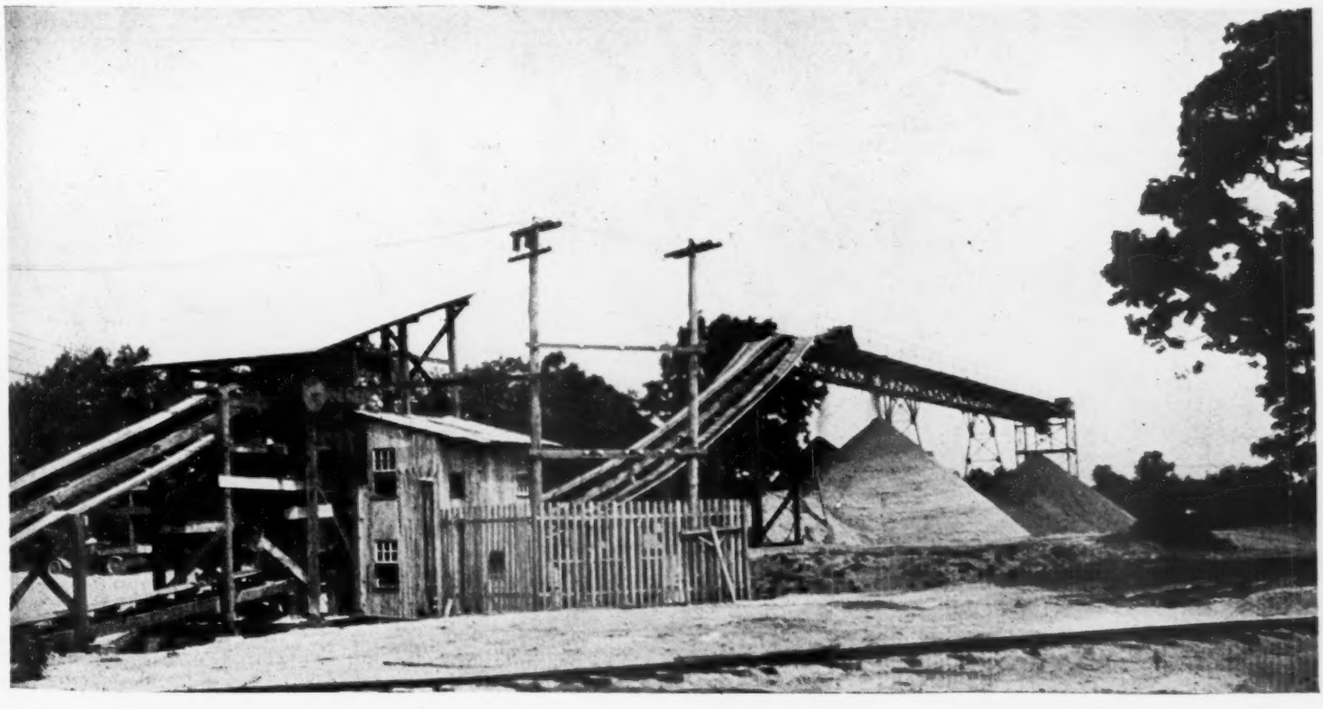
Four good sized pits are worked to produce this sand, and to understand why, one must know that practically all the molding sand that is shipped is a mixture from different pits or from different parts of the same pit. Molding sand men divide sand into "strong" sand, containing considerable clay binder, and "sharp" sand with little or no binder. There is also a "strong" and "weak" gravel, the strong and weak referring to the amount of binder present. Then there is a steel molding sand and furnace bottom sand, which are sands high in silica and containing very little clay. The furnace bottom sand is very fine grained. It looks as though it would all pass a 40-mesh screen.

W. B. Wallen, superintendent of George F. Pettinos operations

The men employed in the pits and in the plant grow very skillful in judging the different grades of sand and of mixtures of sand. Of course molding sands are tested in laboratories both by the producing company and the user of the sand, and they must meet certain well defined standards. But all the loading and mixing is checked by the simple methods referred to here. Mr. Wallen, the superintendent can tell by the appearance and "feel" of the sand just what part of the widespread operation the sand comes from.

In addition to the sand a certain amount of clay is dug and shipped with sands to companies which prefer to mix clay with the sand to bring the bond to their own particular requirements.

The first pit visited was a "strong" sand pit. It is circular; perhaps 1000 ft. in diameter. A track runs around the inside



General view of the storage and screening plant of George F. Pettinos, near Millville, N. J.

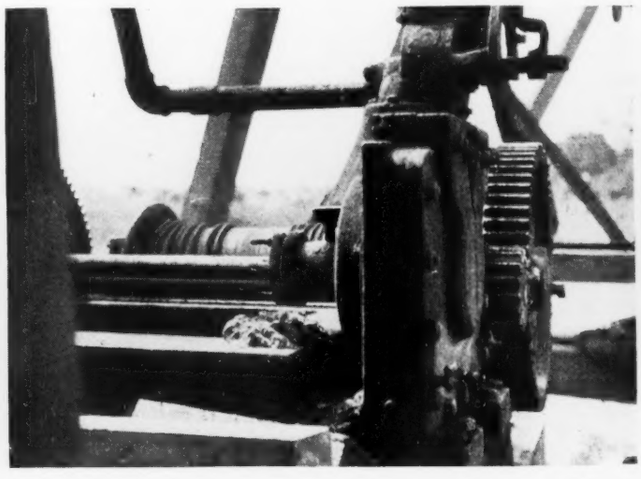
close to the bank, which is 15 to 20 ft. high, on which the cars to be loaded are drawn in and out. This pit happened not to be working at the time it was visited but a Bucyrus steam shovel with a ¾-yd. dipper was stripping the ground above preparatory to taking out "red velvet." The bank, as has been said, varies. This "red velvet" is found in considerable quantity in one place and it is a steel molding sand with considerable binder which foundries use to mix with sharp sand and sand which has already been used. This "red velvet" is about 20-mesh in size.

The next pit was called the "sharp sand pit," the name being sufficiently descriptive. The bank of this pit, which is about the same diameter as the first mentioned, is 40 ft. high on an average. It was being worked by a Northwest gas shovel and the product was going to the plant to be mixed with "strong" sand from another pit.

The third pit contained what was called "iron foundry material." This is a mixture of sand, gravel and clay binder, and it is very strong. It is screened over a 5/8-in. screen to take out the coarser pebbles and is used in this shape for the heavier iron castings. A Thew shovel was loading cars in this pit. The fourth and last pit visited has a combination of operations. There was a bank of strong sand on which another Northwest gasoline shovel was working, and a pond about 12 ft. deep from the bottom of which furnace bottom sand was being dredged by an A-frame excavator. This

A-frame excavator for wet excavation

Loading cars in the "strong' sand pit with steam shovel

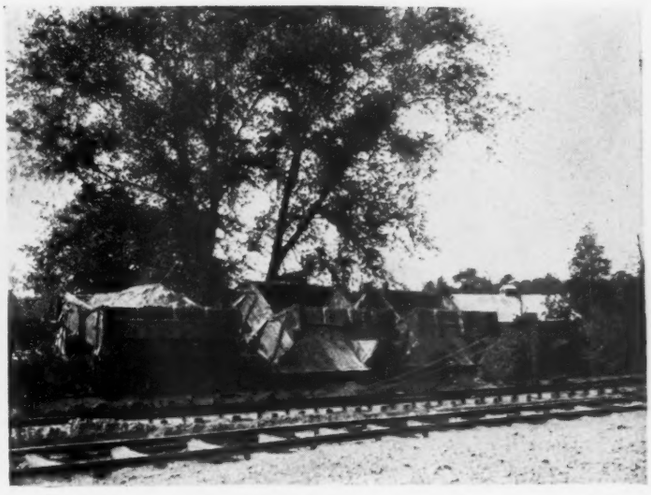


Rotary engine on the swing hoist of the A-frame excavator

Looking across the "strong" sand pit operation

Another view of the "strong" sand deposit and shovel

Discarded dump carts used in previous operations at Millville and vicinity



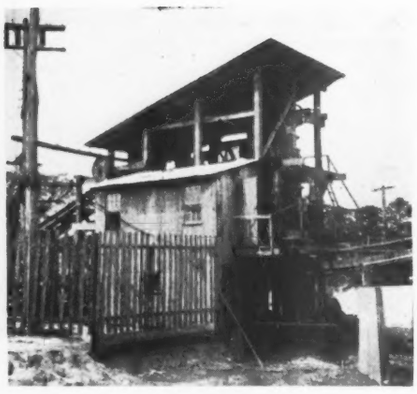
Industrial railway cars dumping into long narrow storage pit in which scraper bucket operates

Stripping the deposit of "red velvet" sand with steam shovel

Loading "iron foundry" sand with a gas shovel

This is the "sharp" sand pit, where the working face averages 40 ft. high

Loading boats with molding sand by motor dump trucks



Screening plant

machine was built by the company from an older machine of the type. It contains a vertical boiler and a three-drum Flory hoist which handles a 1-yd. Hayward orange peel bucket. The swing engine on this machine is a novelty, as it is a rotary engine. It was made by the Dame Engineering Co. of Grand Haven, Mich.; to judge from its appearance it has seen a considerable term of service.

The sand dug by the A-frame is thrown on the shore in a stockpile and as it is needed it is loaded into cars by a second Thew steam shovel.

The steam shovels and gas shovels are all on caterpillar treads and as they are needed they are moved from one part of the ground to another. Mr. Wallen says he finds them thoroughly satisfactory in this way and a move is often made during the lunch hour so that no working time is lost in changing from one pit to another.

The method of mixing sands from different pits has been worked out in a very ingenious way. Cars are sent in according to the mix wanted. Each car holds five tons (most of them are side-dump "Westerns") and if a 60-40 mixture is wanted for every three cars from one pit two cars will be dumped from the other pit. Mechanical counters on posts are used to keep track of the cars so that the tally is always correct.

The cars dump into long concrete-lined pits. There are two of these and a Sauerman crescent scraper bucket operates in each. Each bucket has its own hoist and operator, and the hoists are run so that the amounts delivered by each are in proportion to the mix wanted.

Screening Equipment

The buckets discharge on either of two belts or on the same belt. One belt runs to the screening house and the other goes underneath the screening house and on to the storage trestle. A good deal of the sand needs no screening and can be shipped separately or mixed with material that has passed through the screens. The conveyor systems and belts were furnished by the Robbins Conveying Belt Co.

All screening is dry, of course. There are two screens, a coarse gravel screen and a finer screen which has 5/8-in. wire mesh cloth at one end and 3/8-in. mesh cloth at the other.

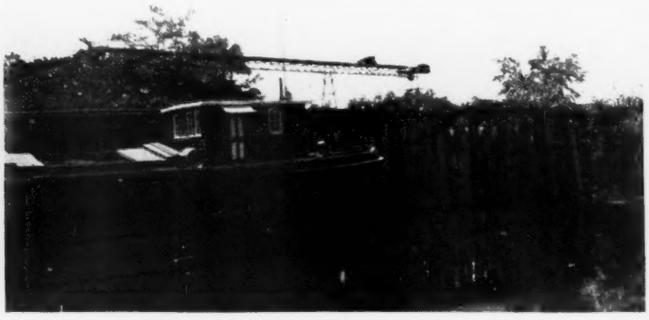
After passing the screens, which were furnished by the Robert L. Latimer Co., the material goes to the storage trestle and is sent to a pile by a tripper.

Water Shipments All Along the Coast and to Europe

Shipments are made both by boat and rail, but the larger part of the output goes out by boat. The plant is on the Maurice river which empties into Delaware bay, about 25 miles below Millville. Both towed and self-propelling boats are used and all the boats belong to a transportation company in which Mr. Pettinos and other sand producers are interested. Shipments by water go to Boston, New York, up the Hudson to Schenectady and other points, down the coast to Norfolk and other southern towns and up the Delaware to Chester and Philadelphia. Shipments have even been made to European countries, transshipping to ocean-going vessels of course being necessary.

The ordinary barge holds 950 tons and the manner in which it is loaded is certainly interesting. The wharf has rails for dump cars, but Ford trucks have been

Warehouse and old screening plant which is no longer used



Dock and barge of the type used for transportation of sand

One of the two scraper hoists used to transport the sand to the screening plant from the storage pit illustrated on previous page

found faster and better in every way. Five trucks handle the 950 tons in ten hours, the trucks being loaded from the storage piles by a Northwestern gas shovel. The wharf is arranged so they can drive in a circle from the shovel to the boat. When they reach the boat the trucks back against a log and dump the cargo into the hatch with the fewest possible motions and then they are back at the shovel so quickly that the shovel has hardly to wait at all. It figures out that a ton truck is loaded every 38 sec.

Trucks for Car Loading

Trucks are used in loading railroad cars also. For a long time it was thought that horse-drawn carts were better for this as it was supposed that horses could get in and out of places where trucks could not go. But Mr. Wallen made experiments and showed that with the same load a Ford truck could go anywhere a horse and cart would go and that the efficiency of the truck became greater as the length of the haul increased. In car loading, five trucks were found to do the work of 13 carts with a less overhead and maintenance cost for one truck than for one horse and cart, taking the season through.

Personnel

George F. Pettinos is owner of the business and the business is not incorporated. He also owns molding and sand plants at Albany, N. Y., and other molding sand or silica sand plants at Mount Holley, Williamstown Junction, Bridgeton, Belle Plain, Richland, Albion and some other places in New Jersey and he also owns and operates a graphite mine near Bethlehem, Penn.

W. B. Wallen, superintendent of the operation just described, has had a wide experience in various branches of the sand business as he had set up and operated excavating and material handling machinery in almost all of them in southern New Jersey, before he came to this operation.

Molding sand has been produced on this site for more than 35 years. Of course in early days production was very small as compared to the present production and any of the present pits look as large as the old pit which it took so many years to dig out.

Canada Quartz Production and Importation of 1924

FINAL revised statistics on the production of quartz in Canada during 1924, as reported by the Dominion Bureau of Statistics, under the authority of the Hon. Thos. A. Low, show that the production of quartz in Canada during 1924 totaled 150,896 tons, valued at $323,156 as compared with 264,076 tons at $599,250 in the previous year.

Imports of silex or crystallized quartz into Canada during the year under review were recorded at 1941 tons, with a valuation of $49,552. Flint amounting to 6016 tons appraised at $64,753, was also imported into Canada.

Rock Products in Automobile Tire Manufacture*

Filling, Curing and Lubricating

THERE are a great many materials which give volume and stiffness but do not specially affect the wear. These are natural rock or earth, ground exceedingly fine and made free from all grit or foreign material.

One of these, whose consumption has become very large during the past few years, is known as rubber makers' clay. It has been used in the china and paper industries for a long time, but quite recently has had a large call from the rubber manufacturers. It comes from Georgia and the Carolinas and is a flour-like powder, so smooth and velvety that it looks good enough to eat.

Georgia and Missouri produce a clay that is much the same, but as a chemical analysis shows, it has a higher percentage of alumina. It is also ground to a fine powder, has all grit eliminated, and becomes the aluminum flake or pigment which is widely used in rubber factories.

Earths and the Part They Play

Other earths have a distinct advantage other than that of a filler. Diotomaceous earth is really the remains of tiny microscopic animals that formerly lived in lakes and swamps. These bodies of water disappeared centuries ago, but animals' remains, in the form of a fine earthy powder, come to us bearing the name of Tripoli. While it comes originally from Nova Scotia, and from some few localities near the Pacific Coast, it is ground, purified and otherwise prepared for use.

From this same district of the Empire States comes asbestine. It is a fine powder, and it too, is identified under the microscope by its fibrous nature. It also has its distinctive value in rubber compounding.

Very closely allied to asbestine, and used in the manufacture of high-grade packing, is asbestos fibre. For it, Goodyear crosses the line into Quebec, where mammoth pits are blasted down into the solid rock, and where powerful crushers separate the fibre from the waste. Asbestos fibre is also found in Arizona.

Use of Barytes

One other ingredient extensively used is barytes, or barium sulfate. It has its origin in Georgia and Missouri, and is merely a finely ground rock. Its nature makes it possible to get the smooth, clean product demanded by the rubber trade.

Then there are the "magnesia twins," which have been used by the rubber manufacturers for many years. Carbonate of magnesia is an exceedingly light, white powder, which comes from large deposits in eastern Pennsylvania. The "H. C." (Heavy Calcined) variety is from a rock which, because of its remarkable purity, was formerly imported from Greece. H. C. Magnesia has a very decided effect upon the compound and for that reason has to be used sparingly and carefully. Its use with Goodyear is limited.

Lime, on the other hand, is a widely used product. It also has properties other than that of an inert filler, and affects the cure decidedly. In the form in which it reaches the manufacturer, it is very finely divided and very pure, and is known as hydrated or rubber makers' lime. Deposits in central Pennsylvania and West Virginia furnish considerable of this, but the best and some of the purest comes from southern Indiana and Missouri.

Soapstone and Mica—The Lubricants

Now for lubricants. The chief one is commonly known as soapstone, but is, in reality, talc. The best, purest, and whitest variety comes from Ontario, but the cheaper grades from Vermont act just as well. It is, in reality, not a compounding ingredient but it is so necessary in a rubber factory and so extensively used there, that it is so classed. It is a crushed rock, taken from the Green Mountains, and is used to dust all uncured, and some of the cured stocks, to prevent sticking.

But talc does not always prove satisfactory, and there are certain places where a pulverized mica is used. Most rubber companies use only the white variety, ground to to hundred mesh fineness, and absolutely free from all grit and sand. There is a brown variety of mica found in Colorado, but its dark color prevents its general use, and the grades most preferred are found only in the mountains of North Carolina and New Hampshire.

Graphite, of various finenesses, is used as a lubricant in the manufacture of certain grades of packing. Goodyear's supply of this commodity comes from Mexico, but consumption of this is very small.

*From an article in "Chemistry of Motor Tire Building" in *Chemicals* for August 3, 1925.

Calcined Talc Hard as Quartz

THE U. S. Bureau of Mines, at its Columbus experiment station, has obtained encouraging results in experiments with talc. Talc when calcined becomes as hard as quartz and has very fine di-electric qualities. The commercial practice in the making of electric heaters has been to carve the necessary models out of soft talc. Before the burning can be completed there is large loss. The Bureau of Mines has demonstrated that the material can be ground up and molded into any form so as to possess a considerable amount of substantiality. The product then can be calcined with little breakage. The process also allows the use of material of much lower grade.

Plant of the J. C. Stewart Company at Oxford, Michigan

A New Plant in a Famous Sand and Gravel Producing District with Trolley-Line Shipping Facilities

THE latest plant to be built in the Oxford, Mich., sand and gravel district is that of the J. C. Stewart Co., of Owosso, Mich. It began producing about July 1, 1925. It differs in many respects from the other plants of the well-known Oxford district. It uses a cableway dragline to excavate the bank material, it has a washing and screening plant which differs from all of the others and it is on the interurban electric line of the Detroit United Railways, Flint division, instead of on the steam road.

This location is important as it gives the plant a different shipping area from the others. It also gives it a different source of electric power, since the plant takes "juice" from the same leads as the trolley line.

The deposit worked is on the other side of Oxford from that worked by the five other plants in this district. The ground here is somewhat more hilly. The character of the deposit is about the same as elsewhere in the district, that is, about 60% of sand and 40% of gravel. The gravel contains considerable oversize, which is crushed and added to the regular gravel product.

The cableway dragline is a standard Sauerman equipment with a 1½-yd. bucket. The hoist which handles the bucket is a 100-h.p. Thomas. It is unusual in that it is fitted with a 600-volt direct-current motor.

The production of the plant is 60 yd. per hour and this is obtained by only three men. One man is at the hoist to operate the dragline bucket, another is at the washing plant and a third attends to the car loading.

The plant sits on a hill so the cableway mast does not need to be as high as it otherwise would to secure a quick return of the bucket. The usual apron and hopper receives the bucket discharge, the hopper being about 16 ft. square with sides sloping 45 deg.

The washing and screening plant was designed by the Smith Engineering Co. of Milwaukee, Wis., who also furnished all the machinery. The first of the machines is a feeder which is at the mouth of the hopper and which assures a uniform feed to the plant. It consists of a trough which is hung on rollers and moved back and forth by an eccentric which has an adjustable stroke. A fixed plate holds the feed on the return stroke but allows it to go ahead on the forward stroke.

From the feeder the bank run stuff falls into a screen with 2¾-in. round hole perforations. The screen is 40 in. in diameter and 12 ft. long. The oversize of the screen goes to an 8A Telsmith crusher of the short type.

A 20-in. conveyor belt with 48-ft. centers takes the undersize of the screen and the crusher product and takes them to a chute in which water is added which washes them down into the sizing screen. This is 48 in. in diameter and 20 ft. long. It has ⅞-in. and 1½-in. round hole perforations in the main section and ⅜-in. perforations in the jacket. The oversize and the through products of the 1½-in. and ⅞-in. sections go to bins and the sand and water which passes the ⅜-in. holes go to two Telsmith sand settling tanks erected in series.

These tanks are of the tilting variety. It was originally intended to make two products in them, the second (fine sand) product being the overflow from the first tank. But it has been found that only one product is needed the greater part of the time, so the second tank is locked and the fine sand sent to waste.

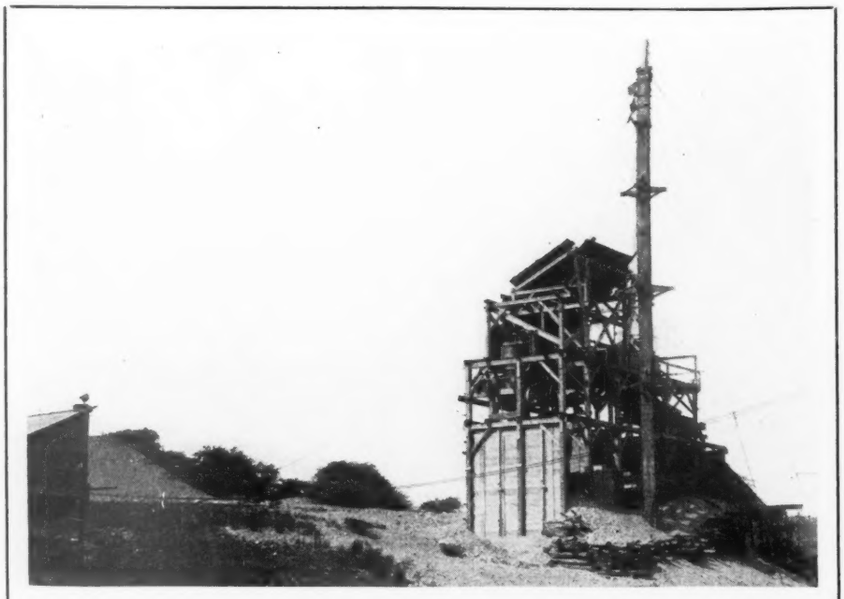
The ground bins are stockpiles built over a tunnel, the different sizes of gravel and sand being separated by vertical partitions. The tunnel is concrete lined and contains a 20-in. conveyor belt. The spouts which feed this belt have an ingenious feeder, a flat plate hung on rollers, which is easily opened and shut and can be regulated to give any feed desired.

This belt discharges to another 20-in. belt which takes the product of the plant to the car that is being loaded. This last named belt is also used as a gravel washer. Sprays play upon it and wash the gravel and, owing to the inclination of the belt, the excess water runs over the end so that only dry gravel goes into the car.

The cars are shifted by a small trolley car which everyone speaks of as the "Toonerville trolley that meets all the trains," as it somewhat resembles the pictures of that famous vehicle.

An excellent feature of this plant is the way the feed can be controlled during the running of the plant. If the cableway operator notes that the bucket is short a tooth he can stop the feeder so that there is no danger of the tooth getting into the crusher. In the same way the top man can warn the hoist man when anything goes wrong and keep him from dumping more feed into the hopper. Two pick handles, used as levers, attached to bell wires control the stopping and starting of the whole plant.

One 75-h.p. Allis-Chalmers motor drives all the machinery in the washing plant.



General view of the new sand and gravel plant of the J. C. Stewart Co., near Oxford, Mich.

Dragline digging reservoir for wash water

National Sand and Gravel Association Convention

ATLANTA, GA., January 19, 20, 21, are the time and place of the tenth annual convention of the National Sand and Gravel Association. The hotel selected is the Atlanta Biltmore, one of the finest hotels in the United States.

The program will be such that no live-wire sand and gravel producer can afford to stay away. And all producers, regardless of affiliation with the National Sand and Gravel Association, are cordially invited to attend. It is to be a convention of the whole industry. Make your reservations early.

C. G. Knoblauch, superintendent

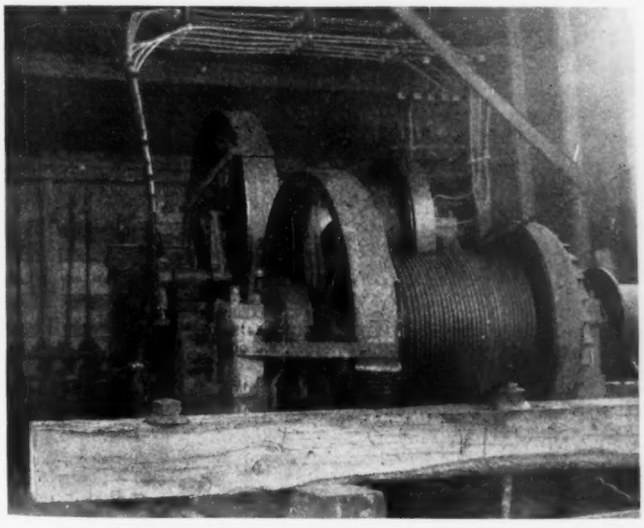
Most of the drives are by chains and sprocket wheels.

The main office of the J. C. Stewart Co. is at Owosso, Mich., where the company has another sand and gravel plant. The superintendent of the Oxford plant is C. G. Knoblauch, who has had much experience in sand and gravel production. He was formerly with H. D. Conkey and Co. at Mendota, Ill., and later was superintendent of a plant at Machias, N. Y.

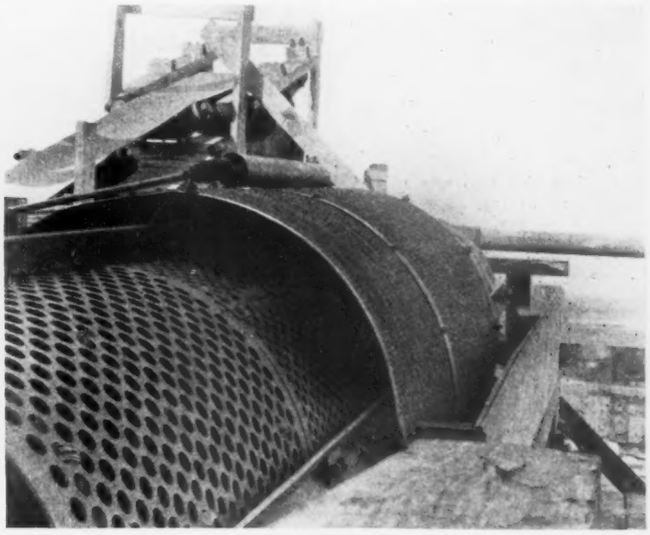
Smothered by Sand Cave-in

COMMODORE P. ABNEY, superintendent of the Garden City Sand Co. of Chicago, Ill., plant near Richland Junction, a few miles east of Evansville, Ind., was smothered to death recently when a sand pit in which he was working with two other men caved in. The body was recovered within an hour after the accident. The two others suffered bruises about their bodies.

The "Toonerville" trolley that does the plant switching



Hoist with 100-h.p. d.c. motor



Sizing screen with roll cleaner

Calcium-Sulphate Retarders for Portland Cement*

Effects of Mixed Retarders Containing Anhydrite, Gypsum and Plaster of Paris

By Ernest E. Berger
Assistant Chemist, Bureau of Mines, Department of Commerce

ONE of the outstanding problems in the nonmetallic industries, and one which involves two of the greatest of these industries, cement and gypsum, is the reaction of portland cement with calcium sulphate. To all portland cement clinker there is added in the manufacturing process, a small amount of retarder, as a necessary ingredient of the finished product. This retards the initial set, increases the strength and adds to the plasticity of the cement so it will have the desired working and setting qualities. The retarder commonly used is gypsum ($CaSO_4$ $2H_2O$), which is the hydrous form of calcium sulphate. Calcium sulphate is also available as plaster of paris ($CaSO_4$ $\frac{1}{2}H_2O$), and anhydrite ($CaSO_4$). The purpose of this inquiry was to determine the form or mixture of forms best adapted for retarder. The problem is complicated by the fact that cement clinker is a complex mixture of calcium silicates and aluminates, and that clinker from different mills, making cement of approximately equal quality, differs considerably in chemical constitution. Thus the same retarder may give very different results with different types of clinker, especially in the percentage of retarder required for the same degree of retardation.

It has been known for some time that a small percentage of plaster of paris will greatly retard the time of set of portland cement as well as increase its strength and plasticity, but whether gypsum and anhydrite will have a similar effect is a much disputed question. The effects of gypsum have received little consideration in laboratory research because, even though it will not retard a clinker when the two are mixed in the laboratory, as has been noted in some instances, the cement will have a normal set when the two are mixed in the large tube mill at the plant, so that practically, gypsum seems to be equally as good as plaster of paris, and because of the great saving in cost it is used almost exclusively.

A wider field of utilization of anhydrite would be of considerable advantage to the gypsum industry. Some quarries are now troubled with quantities of anhydrite mixed with gypsum, a material which is difficult to market. Many other quarries which are now relatively free from this difficulty may have to meet it within the next generation.

*Abstract from U. S. Bureau of Mines, Technical Investigations No. 2705.

Work of Investigators

Three cement companies who had done some experimental work, freely supplied the information they had obtained. The reports submitted varied decidedly in results. Each company made tests using only the clinker from its own mills, and in consequence of the diversity of results none of them felt justified in drawing any definite conclusions except insofar as they applied to the particular clinker used.

A search of the literature has also failed to reveal enough definite information to enable one to form any opinion regarding the values of the different forms of calcium sulphate as retarders. A weakness noted was the recording of percentages of calcium sulphate used without reference to its form and without definite statement as to whether the percentage referred to the SO_3 content or to the amount of calcium sulphate as a whole and many of the reports include no information concerning the properties of the cement clinker. Failure to mention the method used in mixing the retarder with the clinker which has an important bearing on the action of gypsum makes these results unreliable for comparative purposes.

Preparation of Cement and Retarder Samples

Twenty samples were obtained from separate mills representing twelve different states so as to obtain a general idea of the action of different retarders on any cement clinker.

The samples were ground in a laboratory mill with steel balls to a slightly greater fineness than that specified by the American Society for Testing Materials. Each sample was mixed thoroughly and a small representative portion removed for chemical analysis and for a determination of fineness. The remainder of the ground clinker was then stored in air-tight containers where it remained until tested.

All the forms of retarder were the purest commercial grade products available. The plaster of paris contained no other retarder. These samples were passed through a 200-mesh sieve, thoroughly mixed, analyzed and then placed in air-tight jars where they were kept ready for use.

Tests were run with different percentages each of plaster of paris, gypsum, and anhydrite in order to determine which of the forms was the most efficient retarder. Since anhydrite often occurs mixed with gypsum in nature, tests were run with mixtures of the sulphates as well as with pure materials.

The clinker and retarder were weighed out separately and then placed in a 10-mesh screen. The mixture was run through this screen ten or twelve times and then placed in a small pebble mill and stirred for about 20 minutes. This produced a more intimate mixture of the materials than could have been obtained by the sieve mixing alone, and as the mill was only large enough a hold a 1-kilogram sample there was no possibility of enough heat being generated to have any dehydrating action on the gypsum.

The A. S. T. M. specifications were followed in mixing the samples for time-of-set determinations. Both the Vicat and Gilmore needles were used, but, as there was usually a good check in results obtained, only one result is recorded in the table.

The specifications of the American Society for Testing Materials were followed throughout in making the tensile strength tests, except that neat cement was used instead of the 1:3 mortar.

Relation Between Chemical Composition of Clinker and Reaction with Different Forms of Retarders

All of the investigations were conducted with different samples of clinker, so it was thought that the variation in the results might be connected in some way with the difference in composition of the clinker which was used. Consequently, a chemical analysis was made of all the samples used in the bureau tests with the hope of finding not only some relation between the composition of the clinker and the forms of retarder which could be used, but also some relation between this composition and the minimum percentage of each retarder which was necessary for the cement to assume a normal set.

The minimum amount of SO_3 as plaster of paris was studied in its relation to the composition of each clinker and also in relation to the different combinations of each constituent such as hydraulic index, lime ratio, cementation index, and activity index, but no definite relation could be determined

between the composition of the clinker and the amount of SO_3 required for proper retardation.

Different investigators and the bureau made attempts to find some relation between the chemical content of the clinker and the limit of gypsum which could be used, but concluded that no such relation could be found.

It is true that the gypsum failed with all the samples having an Al_2O_3 content above 8% but it also failed where the Al_2O_3 content is below 6%. Similar difficulties were encountered when comparing the action of the gypsum with any other property of the clinker.

When anhydrite was employed as retarder, it may be noted that as long as the total maximum SO_3 content is kept at 2%, anhydrite can be used with safety only when samples of clinker are of themselves slow setting. Even in this case the action of the clinker can not be predetermined by chemical analysis.

Therefore, as long as the composition of the clinker is kept within the limits necessary to produce satisfactory portland cement, the slight variation in this composition will not account for the individual characteristics of each clinker.

There is another important possibility in connection with the utilization of anhydrite. With a quick-setting clinker, the mixtures that were retarded with anhydrite were as strong as those retarded with any other form of calcium sulphate. With a slow-setting clinker the mixtures with anhydrite had a normal set, but the low plasticity, which anhydrite does little to modify, required a large amount of mixing water, resulting in low strength.

However, $3CaO\ Al_2O_3$ must be present to some extent in both clinkers. It is possible that a correct proportioning of the raw mix along with a careful control of the burning process might produce a clinker which, when mixed with anhydrite, will produce a cement equal to that retarded with any form of calcium sulphate.

Effect of Different Retarders on Consistency and Plasticity of Clinker

The clinker itself has a low plasticity, and a large amount of mixing water is required before a normal consistency can be obtained. If used in this form it would be impossible to remove all the air pockets from the mortar, and a very weak and unsatisfactory cement would result.

Plaster of paris increases the plasticity more than any other form of calcium sulphate. The amount of water required is independent of the percentage of plaster used, within experimental error, as long as this percentage is kept within the limits necessary for proper retardation. Another notable feature in the action of plaster of paris is the fact that it is just as effective when mixed with gypsum or anhydrite as when used alone, regardless of the fact that neither of the latter forms are as efficient for increasing the plasticity. Therefore, as long as the plaster makes up 50% of the SO_3 in the retarder, it is still possible to use the minimum amount of mixing water.

There is no doubt that gypsum does have some effect on the consistency of the clinker, and that this effect is not identical with that produced by plaster of paris. The cement containing anhydrite requires even more mixing water than when gypsum is used; in fact, it either approaches or is equal to the amount required for the clinker itself.

Therefore, when any form of calcium sulphate increases the plasticity of cement clinker, plaster of paris is the most efficient and it is necessary that some of the retarder be present in this form if the most plastic cement is to be obtained.

Effect of Different Forms of Calcium Sulphate on the Time of Set of Portland Cement Clinker

It is a more or less common opinion that portland cement clinker itself is always quick setting; however, a study shows that some types of clinker are slow setting when no retarder is added.

Plaster of paris was the first compound to be used as a retarder in portland cement, but it was soon discovered that gypsum could also be used if it was mixed with the clinker in the tube mill, and because of the great saving in cost, the utilization of gypsum was soon made universal. The outstanding feature in the use of plaster of paris for a retarder is the small amount required.

The permissible variation in the SO_3 content is generally quite small when plaster is used. In most instances the cement becomes quick setting again before the total SO_3 content reaches 2%, and sometimes before it reaches 1.0%. This latter condition will probably account for the opinion of some that plaster of paris alone will accelerate and not retard the time of set of cement, but a study shows that it is the most effective retarder if the proper percentage is used; in fact, it is the only one of the three forms of calcium sulphate which is certain to be effective as long as the maximum SO_3 content remains within 2% limit. As regards strength, however, as will be noted later, there is some advantage in using a type of retarder which will permit a larger percentage of SO_3 since the strongest cement is obtained only when it contains approximately 2% of this compound.

There are no articles in which the statement does not appear that gypsum as a retarder is just as effective as plaster of paris. Tests show that, in some cases, gypsum is equally as efficient as plaster of paris; retarding is as satisfactory, but a larger percentage of SO_3 is required than when plaster is used. In other cases poor efficiency results, for the addition of gypsum up to SO_3 content of 2% did not retard the minimum setting time even one hour.

Another important difference between the action of gypsum and plaster is that larger percentages of gypsum do not seem to produce a quick setting cement.

It has been found that cement to which gypsum had been added did not change its setting time in six months when stored in an air-tight container, and a German portland cement association report shows that after a year's storage a cement to which 2.5% of gypsum had been added showed no appreciable change in time of set. Both of the above experiments were conducted with samples of cement, not clinker. The material was cool, and the added gypsum would neither be as fine nor as intimately mixed with the clinker as if it had been ground commercially, consequently the results are not conclusive.

No definite conclusions can be drawn regarding the action of the cement clinker on the gypsum during storage, and it seems logical to assume that the reason for change in time of set could be found here rather than to assume that some change takes place in the clinker itself. It is a well-known fact that both carbon dioxide and water have a marked effect on the setting time of cement, but it seems improbable that either of these would penetrate deeply enough from the atmosphere into the bin of cement to cause any effect at least within the first few weeks.

The value of anhydrite as a retarder in portland cement clinker is also a much debated problem among cement manufacturers. Tests show that anhydrous calcium sulphate is the best form of retarder, and that it compares equally well with the other forms of calcium sulphate. However, artificial anhydrite was used in both these tests and, as the method of preparation of this material is not given, it is quite possible that it was not burned sufficiently to possess the characteristic properties of natural anhydrite, or it may have even contained a considerable amount of soluble anhydrite.

Mixed Retarders

It seems quite certain that anhydrite alone would not make an efficient retarder, but another possibility has been suggested, namely, the use of a mixture of gypsum and anhydrite. This phase of the investigation is of great importance since anhydrite is usually found mixed with gypsum in nature.

The first tests seemed to indicate that plaster of paris is really the form of calcium sulphate that produces the most favorable reaction with portland cement clinker, and that gypsum as such might have no effect at all, consequently, it was thought advisable to use mixtures of plaster of paris and anhydrite rather than gypsum and anhydrite as the results obtained with the latter mix, in the laboratory, would often be negative and little information would have been obtained.

Four mixtures in all were tested for their values as retarders: one containing equivalent amounts of SO_3 as plaster and anhydrite; another containing 70 parts of SO_3 as plaster and 30 as anhydrite; two samples were tested with a 60-40 plaster-anhydrite mix, and some tests were run with a mixture containing equivalent parts of SO_3 as plaster and gypsum as the results seem to indicate that this was similar to the conditions obtained commercially.

So far as time of set is concerned, the anhydrite in the mixed retarders has very little effect and surely not enough to justify the large increase in the amount of retarder which is necessary. A study of the tensile strength tests shows a more favorable attitude toward the use of the mixture containing anhydrite.

A 50-50 plaster-gypsum mixture was used. It was found that the retardation was equivalent to that obtained by the use of any other form of retarder. There were not enough tests run to obtain data regarding the amount of SO_3 required for proper retardation, but it is greater than when plaster alone is used.

The mixed retarders have two important advantages: first, maximum plasticity and proper retardation are obtained without the possibility of producing a quick-setting cement with an SO_3 content below 2%, and second, a moderate variation in SO_3 content may occur without causing any appreciable variation in the time of set of the cement.

Thus the conclusion is reached that plaster of paris is the form of calcium sulphate which is the most active in its effect upon the time of set of portland cement clinker. Gypsum is less efficient and anhydrite has practically no effect on time of set. Mixtures seem to be more desirable than any of the forms alone, and all the available information points to the conclusion that mixtures are being obtained in present mill practice.

Effect of the Different Forms of Calcium Sulphate on the Tensile Strength of Portland Cement

In many investigations on the effect of retarders in portland cement clinker, the relation between the form of retarder used and the strength of the cement has been entirely neglected. Some tests show the cement to be sufficiently retarded by anhydrite but the tensile strength greatly impaired.

A study of data shows the weakness of the clinker as compared with the cement containing 1.50 to 2.0% SO_3 in any form of calcium sulphate, but it will be noted that in all instances there is a definite relation between the strength of the clinker and that of the finished cement.

On the addition of plaster of paris there is a gradual increase in strength. This effect is quite independent of the time of set, for the time may change from a flash set to a normal set of three or four hours within a variation in SO_3 content of less than 0.20%, while strength continues to increase until the SO_3 as plaster is approximately 2.0%.

Results show that cement retarded with plaster has greater strength than that retarded with any other form of calcium sulphate. Some of this advantage is lost because the amount of plaster permissible for proper retardation is often less than that required for maximum strength.

The use of plaster as such is, of course, not economically possible, and furthermore the necessity for close control of the SO_3 content might make it somewhat undesirable. A study of the mixtures indicates, however, that plaster should make up only that part of the SO_3 necessary for proper retardation. On the other hand, a study of the comparative values of each retarder shows the improbability of obtaining the best portland cement unless this percentage is present. Therefore, it seems desirable that there be some control of conditions in the tube mill as well as in the kiln if the most desirable cement is to be obtained, for in so doing there might be some control of the percentage of each form of retarder produced, and consequently the strength of the resulting cement might be more definitely governed.

It has been noted that an excessive percentage of gypsum is not as injurious as excessive plaster, but other tests show that on longer aging the gypsum will also weaken the cement. It was found that the limit which could be used varied, however, the limit in most cases being reached when the SO_3 content approached 3.0%. It is a well-known fact that the strength of cement is inversely proportional to the amount of mixing water used. The difference in strength of the mixtures containing gypsum and plaster is closely related to the difference in amount of mixing water required to bring each up to normal consistency. Likewise the cement containing anhydrite, which requires even more mixing water, produces the weakest cement of all.

The larger amounts of mixing water required for proper consistency would then account for the weakness of the cement containing gypsum or anhydrite. Furthermore, in order to retard a clinker which has a flash set it is necessary that its reaction with the SO_3 ion be almost instantaneous, and plaster of paris seems to be the only one of the three forms of calcium sulphate investigated, which has a rate of solubility that will satisfy this demand.

Results indicate that a retarder made up of both plaster of paris and anhydrite is superior to a retarder consisting of any one form of calcium sulphate. However, the data indicate that through partial dehydration of gypsum by the heat of grinding, a mixed retarder containing both plaster and gypsum is now being produced in mill practice. A study of the comparative strength of cement containing different mixed retarders shows one type of mixed retarder to be just as efficient as another.

This evidence substantiates the statement that as long as there is sufficient SO_3 present as plaster to retard the cement properly the action of the remaining SO_3 with the clinker is independent of the form of calcium sulphate from which it is produced, and consequently it would be permissible for the cement retarder to contain equivalent portions of anhydrite and plaster except in a few cements where it is necessary to increase the percentage of plaster in order to obtain proper retardation.

Suggested Mill Tests on Mixed Retarders

1. Set aside a supply of well mixed clinker for the test so that a uniform product will be used.

2. Note the conditions in the tube mill and keep them as nearly constant as possible, that is, carefully control the temperatures of the mill and adjust the feed so that a product of uniform fineness will be obtained.

3. Determine the amount of SO_3 as plaster of Paris which, when ground with the clinker in the tube mill will give proper retardation; also determine the maximum strength obtained by using this form of retarder. (Maximum SO_3 content to be 2%.)

4. Note the effect of varying percentages of gypsum as such on the clinker.

5. Add increasing percentages of gypsum to the clinker, grinding in the tube mill, in the usual manner, so as to determine the minimum amount required to produce a cement having a normal set, and also the percentage necessary to produce the maximum strength. (Test these mixtures soon as possible.) If gypsum as such does not retard the clinker, a comparison between the minimum SO_3 content obtained here and that obtained under (3) will give a close estimate of the amount of gypsum calcined in the tube mill, and if this percentage of SO_3 is either greater than that obtained in (3) or less than the minimum per cent in (4) it will show that at least some of the gypsum was calcined even though the gypsum as such did have some effect as a retarder.

6. Run a series of tests using mixed retarders. First add a sufficient amount of gypsum to produce a cement having an SO_3 content equal to that which was found under (5) to have the maximum strength. Then, keeping the total SO_3 content the same, use increasing proportions of anhydrite in the retarder until a point is reached where the cement either becomes quick setting or begins to decrease in strength. This will give the maximum proportion of anhydrite which may be present in the retarder as long as the total SO_3 content of the cement retains at this percentage.

If it is found impossible to add any anhydrite to this retarder without injuring the quality of the cement it would simply show that a larger amount of retarder is required when anhydrite is present and consequently its use would not be advisable.

Advantages of Using a Mixed Retarder

The advantages that may be obtained by the use of the mixed retarders, gypsum and anhydrite, will depend somewhat upon the conditions which exist at each individual plant. However, three possible factors in its favor will at least justify further investigation. First, the possibility of obtaining mixed retarders more economically; second, the advantage which would be gained by finding a wider utilization for mixtures of anhydrite and gypsum which are encountered in some gypsum deposits; and third, the advantage of obtaining a retarder which has little possibility of changing enough during storage to effect the time of set.

Conclusions

1. As long as the composition of the clinker is kept within the limits necessary to produce a satisfactory portland cement.

neither the individual properties of the clinker nor its reaction with the different forms of retarder can be predetermined by a study of clinker composition alone. However, a detailed study of the constitution of the clinker and complete knowledge of the conditions maintained during each step in the process of its manufacture, along with a study of the physical and chemical properties of the resulting cement, would go a long way toward determining the best type of portland cement which it is economically possible to produce, and would open the way for elimination of variations in the properties of different cements.

2. For all the samples which were tested in this investigation, plaster of paris was the most efficient form of retarder, and is the only form which is certain to retard all samples of clinker as long as the maximum SO_3 content of cement is maintained at 2.0%. However, the high cost of this material along with the fact that it often makes a quick setting cement before there is sufficient SO_3 present to produce the strongest material, shows that the plaster should make up only that portion of the SO_3 content which is needed for proper retardation of the clinker.

3. When gypsum, as such, is used as a retarder a larger percentage of SO_3 is required than when plaster is used, and in some cases it does not retard the clinker at all. Furthermore, wherever it may be used, a larger amount of mixing water is required to produce a normal consistency, and consequently the strength of the cement is proportionately weaker. All the evidence available points to the fact that when gypsum is ground in the tube mill with clinker more or less plaster of Paris is produced during the grinding process, and therefore a mixed gypsum-plaster retarder is obtained.

4. Anhydrite, when used alone as a retarder, failed to produce a satisfactory cement with any of the twenty samples of clinker tested. A large amount of mixing water was required; it retarded only those samples of clinker which were of themselves slow setting, and the cement containing this form of retarder was, as a rule, weaker than that which had been retarded with any form of calcium sulphate.

5. The use of mixed retarders (anhydrite and plaster or gypsum and plaster) produces a more satisfactory cement than can be obtained by the use of any one form of calcium sulphate alone, but it is necessary for the mixture to contain enough SO_3 as plaster to retard the clinker if the best portland cement is to be obtained.

6. The value of mixed retarders is practically independent of the form of calcium sulphate used as long as there is sufficient SO_3 present as plaster of Paris to retard the clinker. This latter conclusion, however, is based on the results obtained in laboratory tests, and consequently mill tests must be conducted to determine whether a mixed retarder can safely be used in the manufacture of portland cement.

"Mechnical Underground Loading in Metal Mines"

Review of Book by Coburn, Baumgarten and Van Barneveld

By J. R. Thoenen
Mining Engineer, Greenville, Ohio

THE School of Mines and Metallurgy of the University of Missouri has just released a 600-page volume entitled "Mechanical Underground Loading in Metal Mines," by Charles E. Van Barneveld. The volume is a co-operative publication by the Mississippi Valley section of the United States Bureau of Mines and the Missouri School of Mines and Metallurgy, being the result of several years' investigation begun in 1919 by C. L. Coburn, mining engineer, continued by Karl Baumgarten, mining engineer, and completed by Mr. Van Barneveld.

The absence of a table of contents is rather confusing, and as a result one's first impression in looking over the book is that of a mass of valuable but un-correlated data on a number of subjects relating to mining. A second observation reveals a division into four parts, viz: General discussion, description of mechanical shovels, description of scraping machinery and operation and a description of mechanical shovel installations.

Part 1 or general discussion goes into the underlying causes of the present tendency toward mechanization (in all its phases) of mining, citing "mucking" or, loading ore into cars, as the last of the major operations into which mining is divided to give way to modern machinery. The development of mechanical loading is touched upon and loading machines classified as to construction, applicability, and class of ore handled. Accessory equipment is then discussed covering various types of cars and their construction, mine track with side tracks and switches, and some thirty pages devoted to locomotive haulage with advantages and disadvantages of various units. The following pages discuss among other things, the relative merits of different types of power for mechanical shovels, adaptation of mining operations to mechanical loading, organization of operating crews, maintenance, delays, time studies, operating records and conditions governing the introduction of loading machines into new and old mines.

Part 2 is devoted to a detailed study and description of the product of thirteen manufacturers of mechanical shovels with working diagrams, specifications and illustrations.

Part 3 describes in detail various types of mechanical scrapers with sketches of typical installations in different parts of the country. The author concludes that scraping cannot compete with the mechanical shovel in speed, but where economy and not speed is the prime factor the shovel has a keen competitor in the scraper and portable hoist.

Part 4 comprises the last 250 pages of the volume and covers descriptions of mining operations in thirty-one different type cases where mechanical shovels are used in metallic and non-metallic mines. Each individual case is described minutely with all operating conditions shown which might in any way affect the loading operation. Time studies are given and discussed as are also loading costs and all matters that have a bearing on them.

The book as a whole is of such a nature that one cannot grasp its full message from a casual reading. Essential conclusions are lost in a mass of detail. As a reference book the publication has no equal in its field. Elimination of much of the detail and confining the subject matter to a discussion of shovel loading only would have resulted in a much better balanced treatise and made the message much clearer. Scraper loading while analogous to shovel loading is a very different operation and is worthy of separate publication. Mechanical haulage it is true exerts great influence on the efficiency of the shovel loading operation, but as with mechanical scraping there is enough material in this subject for a volume in itself.

While average loading costs with mechanical shovels including repairs, depreciation, etc., are somewhat lower than hand loading the author recognizes the fact that this does not always hold true. The value of a mechanical shovel underground lies in its ability to produce the tonnage required during times of labor shortage, and, to shorten the time required to load a given tonnage from the working places. This ability automatically speeds up the transportation and increases the activity all along the line.

In the rock products industries probably the largest field for this class of equipment will be found in mines getting out limestone for purposes other than the manufacture of lime. The mechanical shovel will not sort stone as it loads and as a result where production is small and a selected product is required it is doubtful if mechanical loading will find immediate application. Certain types of shovels which combine a conveyor belt in their construction may eventually be adjusted to this class of mining where the chemical properties of the stone are the governing factors. Where sizing of stone is necessary the present shovels are not applicable and hand loading must continue except where production is of sufficient magnitude to warrant surface screening and sizing.

Recent Work of the Lime, Gypsum and Sand-Lime Brick Section of the Bureau of Standards*

Improvement of Plasticity of Hydrated Lime—Sand Carrying Capacity of Quicklime—The Weatherproofing of Gypsum—Manufacture of Gypsum Products—Bond of Mortar to Sand-Lime Brick

Introduction

THE activities of the Bureau of Standards relative to lime, gypsum and sand-lime brick may be conveniently divided into the following five classes: (1) Development of standards of quality; (2) Investigations which lead to improved methods of manufacture; (3) Investigations which indicate better methods of use of existing products; (4) Investigations which have for their purpose the development of new products; (5) Investigations relative to new uses for existing products.

Inasmuch as the unsolved problems relating to lime, gypsum and sand-lime brick are so numerous it is the policy of the bureau to undertake the solution of only those which will result in the greatest benefit to the largest number of interested parties.

This resume is intended to acquaint the readers of ROCK PRODUCTS with the more important investigations which have been recently completed or are at present active at the bureau.

Very close co-operation is maintained between the bureau and the national organizations of the three industries. The lime and gypsum associations maintain research associates at the bureau who materially expedite the development of information of interest to these bodies. A number of the investigations enumerated below are so conducted. The incumbents are E. A. Miller for the National Lime Association and J. P. C. Peter for the Gypsum Industries, Inc. Furthermore, inasmuch as the technical staff of the National Lime Association is located in Washington, exceptionally close contact has resulted.

Problems Relating to Lime

Improvement of the Plasticity of Hydrated Lime—High plasticity is a quality of hydrated lime desired by all lime producers of their material. In some cases lime manufacturers have encountered considerable difficulty in obtaining a plastic hydrate from the limestone they use, and it is thought that this difficulty with one stone and the ease of producing plastic hydrate with another might be due to some physical characteristic of the limestones.

In the hope of finding some connection between the qualities of limestones and the plasticities of the hydrates prepared from them, a study of limestones and limes was begun recently. The literature on the subject describes limes but not the original stones nor the heat treatment by which they were obtained. In the industry, stone is burnt in such a way as is found to give the best product for the particular stone at hand, but the process varies with the different producers and with the stone they use. To correlate these data on the limes with the characteristics of the original stones and the method of burning is the object of this investigation.

Ten samples of stone from different localities, varying in composition from a dolomite to a high calcium stone, have been obtained. These, after being analyzed and microscopically examined, will be burnt at different temperatures and for different durations. The limes so obtained will be examined physically, chemically, and microscopically. At this writing one-half of the stones have been analyzed and burnt, but the limes have not been studied sufficiently to draw any conclusions.

Lime for Use in the Manufacture of Bleaching Powder—In the manufacture of bleaching powder a very important factor for the production of an active product is the amount of water used in hydration of the lime. In order to prepare specifications for lime to be used in this process, the Interdepartmental Conference on Chemical Lime found considerable investigative work to be necessary and the bureau was requested to undertake this work.

Definite weights of chemically pure quicklime were added to definite amounts of water, and the resulting hydrates analyzed for free and combined water, carbon dioxide, and free calcium oxide. These hydrates were then subjected to the action of chlorine, under identical conditions, for a period of 24 hours. At the end of this time the available chlorine content of each sample was immediately determined. After 30 days the available chlorine and the apparent density were again determined. The rate of settling from water was also studied.

It was found that a satisfactory bleaching powder could be made from hydrates which were prepared using from 32½ to 55% of water, based on the weight of quicklime used. The best results were obtained with hydrates made with 45 to 50% water. Forty-five per cent can well be recommended as an excellent value, since above 50% the strength of the bleach falls off rapidly with the increased water content.

The Sand-Carrying Capacity of Quicklime—The relationship of the putty yield of quicklime to its sand-carrying capacity has long been the subject of discussion in the preparation and use of quicklime mortars. In order to determine this relationship a representative group of quicklimes were obtained and their yields of putty measured. Mortars were proportioned by weight and varied in composition from 50% lime and 50% sand to 10% lime and 90% sand at 5% increments, with plasticity, shrinkage, and strength (tensile and compressive) determinations being made on each mix.

Results of this work indicate that a lime mortar should not be richer than 20% quicklime (by weight) nor leaner than 10% quicklime. The greatest number of advantages may be obtained from a mortar containing 15% quicklime by weight of the *dry* sand-lime mix. Converting from a weight basis to a volume basis, we have for the 20, 15 and 10% mortars, 1:1, 1:1½, and 1:3 mixes respectively.

Quicksetting and Hydraulic Lime—An investigation which has for its purpose the production of a quicksetting lime by the calcination of limestone containing relatively high percentages of silica and alumina is being conducted. Basis for the belief that such a material may be produced is the fact that lime will combine, under proper heat treatment, with silica and alumina to form compounds which have quick setting and hydraulic properties as well as greater strengths than ordinary limes. The results obtained, to date, indicate that such a material can be produced provided that certain difficulties in the hydration process can be overcome. The material which has been produced has fairly rapid set and when immersed in water exhibits a greater strength

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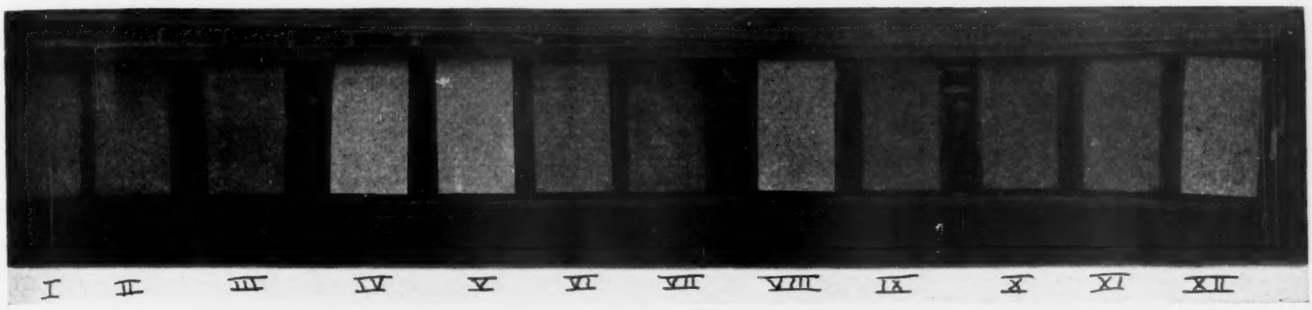
than when aged for the same period in the air. When burned at from 1000-1200 deg. C. (1832-2192 deg. F.) for periods of from 18 to 24 hours, carefully hydrated, ground, and made into test specimens, a time of set of from 7 to 9 hours was obtained with an average tensile strength of a 1:3 mortar at the end of 48 hours of 30 lb. per square inch. Thirty day tensile strength tests of 1:3 mortars in air and water storage gave average tensile strengths of 25 and 50 lb. per square inch respectively. The product so far obtained, however, has not the strength which it is believed possible to obtain and it is hoped that, with closer control and some modifications of the process of hydration, the desired product will result.

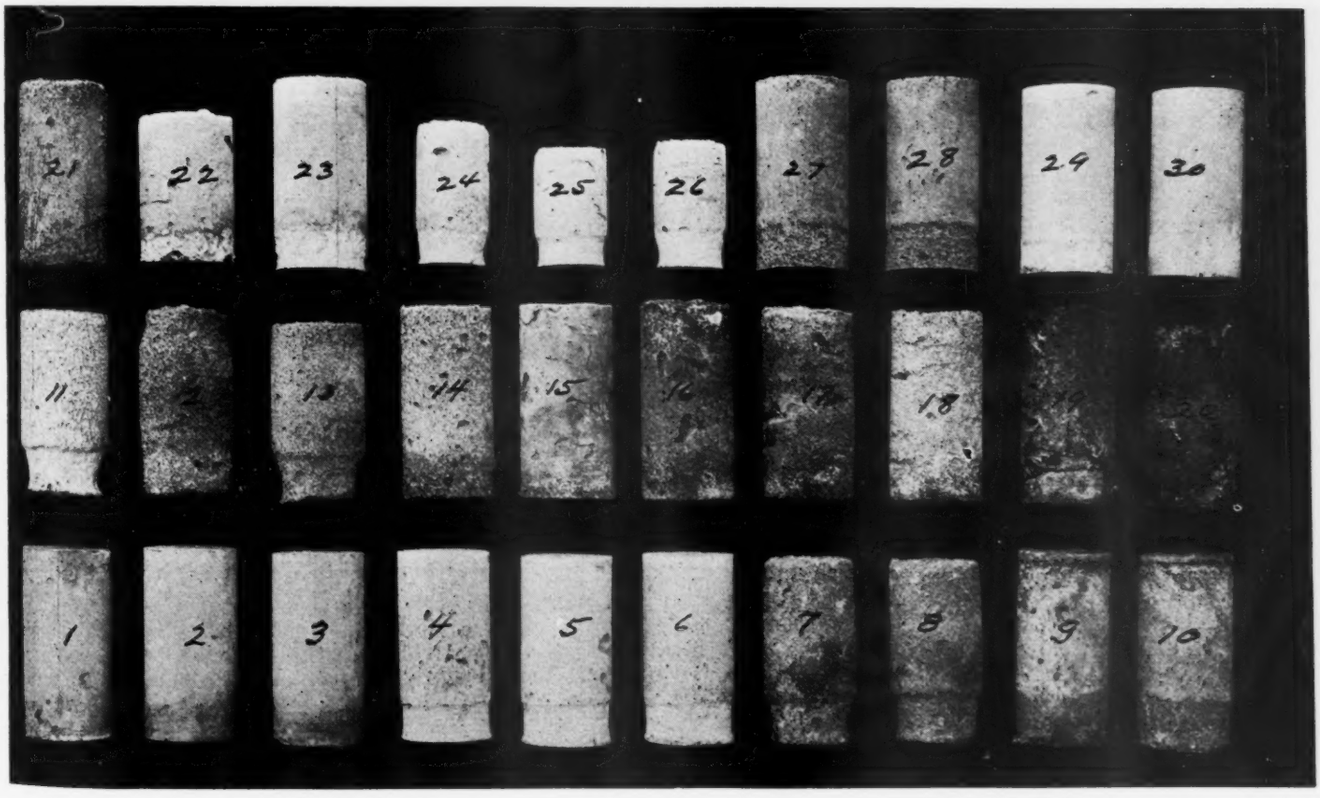
The Analysis of Lime Plaster—One of the factors which has long been credited with the responsibility for a great number of plaster troubles is the slow hydration of the magnesia present in many limes. The magnesia, having been heated in the lime-burning process to temperatures approaching 1100 to 1200 deg. C., has been rendered very inactive, so that it may combine with moisture to form the hydrate only after the lapse of a considerable period. Since the hydration of magnesia is accompanied by expansion, the result of this hydration on the set plaster might produce very undesirable results; in the less serious cases, pops, and as the worst, complete failure.

The major phase of the problem which is at present under investigation is the development of a method of analysis which will give information as to the exact condition of magnesia content of the mortar. Ordinary chemical analysis will give the total magnesia content of the material, the total lime, or calcium oxide, together with the total carbon dioxide, the total combined water, etc., present, but it gives no indication as to the way in which these radicals are combined. After a considerable amount of preliminary work it was decided that the most promising field was that of the thermo-chemical analysis. Since magnesium and calcium hydroxides decompose at different temperatures to lose their water of hydration, and since the vapor pressure of calcium hydroxide is very small at a temperature at which magnesium hydroxide is completely decomposed, it should be possible to determine the loss in weight of a sample of hydrate at the decomposition point of the magnesium hydroxide, and from this to calculate the percentage of magnesium hydroxide in the sample. Then by raising the temperature to the decomposition point of the calcium hydroxide the percentage of this substance present should also be obtainable. The method has given every promise of success, but up to the present time the mechanical difficulties involved have required the expenditure of considerable time.

The Manufacture of Lime—Bureau of Standards Technologic Paper No. 16, "The Manufacture of Lime," was published sev-



Panels of treated gypsum plaster after 18 months' exposure to the atmosphere



Cylinders of gypsum mixtures after 18 months' exposure to the atmosphere

eral years ago. It proved a most valuable contribution to the literature on the subject and has consequently had wide distribution and has been of inestimable value to technologists and manufacturers of lime. However, since the issuing of this publication many changes have occurred in the industry and the necessity for a revision has long been felt. Therefore, recently, to obtain the information desired, twelve lime plants, one ready mixed plaster plant and one limestone crushing plant were visited. At each locality an innovation in the lime industry was observed. The data collected are being used in the revision of the technologic paper.

Problems Relating to Gypsum

The Weatherproofing of Gypsum—Gypsum, though satisfactory as a plaster and tile for inside work, has not proven satisfactory for outside construction, the reason being its slight solubility in water. If this material could be so improved as to be more resistant to the weather there would immediately be a new market open which has not as yet been touched. With this in mind the investigation of methods of weatherproofing gypsum was undertaken.

In attacking this problem three general methods presented themselves: First, covering the set material with some waterproof coating in order to keep the moisture from the gypsum; second, precipitating on the surface an insoluble compound formed by a reaction of some material with the gypsum; and third, by the addition of an integral waterproofing compound to the gypsum, which when the gypsum has set acts as a water repellent. In the beginning of the investigation many small cylindrical specimens of gypsum were made and treated in one of the ways described above and then exposed to the weather. At definite intervals of time these were dried, weighed, and tested for absorption. At the end of one year's exposure, panels were made of the same composition as the small cylinders which upon examination gave promise of satisfactorily withstanding the weather. These panels were exposed to the weather and are now examined from time to time.

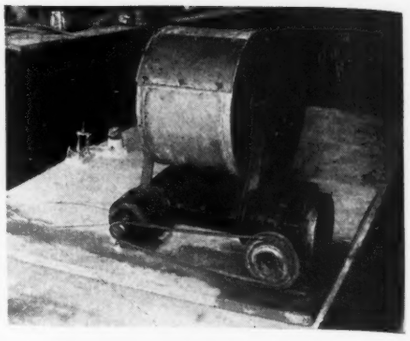
Under the first method, that of covering the set material with a waterproof coating, the following have been used: Waterproof paints, varnishes, shellacs, whitewashes, paraffins, waxes, stearic acids, glues. The results in most cases have not been very promising. The coatings crack and peel off. The waxes and paraffins are offering the best possibilities as weatherproof coatings of this type.

Under the second method, that of precipitating on the surface an insoluble compound formed by the reaction of some material with the gypsum, the following compounds have been used: Barium chloride, sodium bicarbonate, ammonium phosphate, ammonium oxalate, lead acetate, barium hydroxide. The results obtained with the salts did not warrant any recommendation of these compounds as weatherproofing materials. However, in the case of barium hydroxide the results were very promising. Cylinders of gypsum which were treated with a hot solution of barium hydroxide are resisting the weather very well. Even at best the protection is only temporary, however, for after a period of approximately two years the cylinders begin to weather away about as fast as do the cylinders of untreated gypsum. It is probable that another application of the barium hydroxide solution will protect the gypsum for a similar length of time. This is being investigated.

Under the third method, by the addition of an integral waterproofing compound to the gypsum, the following compounds have been used: Zinc stearate, glue, gum tragacinth, gum arabic, glycerine, dextrin and water glass. None of them seems to increase the weather resistance of gypsum for any appreciable length of time.

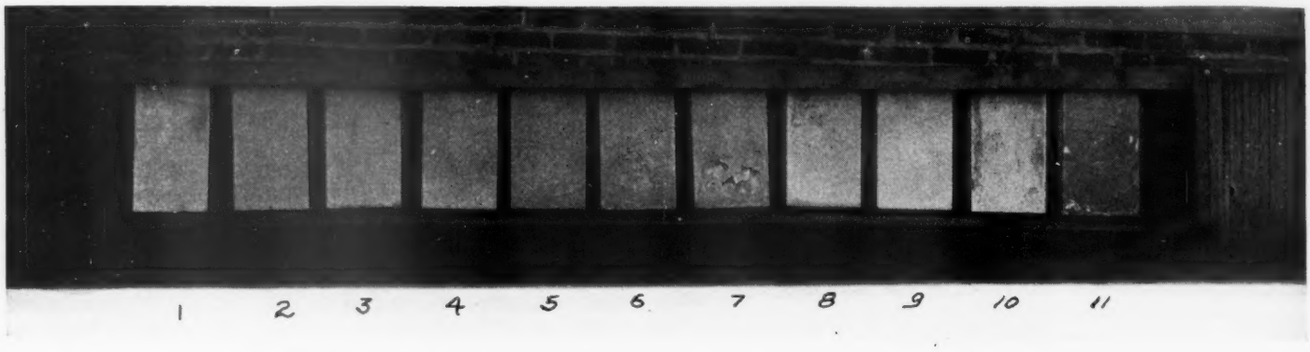
As new methods of treatment come to our attention cylinders are made and exposed for observation. (Photo of panels and specimens after 18 months' exposure.)

Ready-Sanded Gypsum Plaster—Although gypsum plaster mixes have been prepared and used for many years, little or no work has been done to develop or improve formulas for these mixes. Numerous requests having been made to the bureau relative to the composition of a satisfactory ready-sanded gypsum plaster, an investigation has been undertaken to determine formulas for gypsum plaster mixes with especial reference to ready-sanded plasters. Using a representative commercial unretarded gypsum gaging plaster and Potomac river sand, which meets the specifications for a gypsum plastering sand, a study is being made of the effects



Laboratory mechanical gypsum plaster mixer

that different percentages of sand and materials usually employed to improve the working qualities of plaster have on the physical properties of the finished product. The following materials will be used with the sand and gypsum: Clay, hydrated lime, ground asbestos, wood fibre, hair, and talc.



Panels of gypsum plaster after exposure to the weather for 18 months

Different percentages of sand and gypsum plaster are being tested as preliminary work to determine what ratio of these two materials gives the best working and most suitable plaster. Different percentages of the above materials will then be added and their effect noted. Each mix is being tested for the following physical properties: Tensile strength, compressive strength, dry volume, wet volume, water to bring the mix to testing consistency, and the working quality of the putty. The retarding effect of each of the materials will also be considered.

Inasmuch as the working quality of each mix must be measured and as there is no method at present for this determination a study has been made to develop some device that would measure the working qualities of a sanded-gypsum mix. Since plasticity is a measure of the workability of a plaster mix, a study was made as to the possibility of suitably re-designing the Emley plasticimeter, which is used to measure the plasticity of limes. Although it was found necessary to use a smaller bob and a greater speed than is employed with lime, it was found that this instrument could be used very successfully to measure the working qualities of a gypsum-sanded mix. In order to obtain some idea of the physival properties required of gypsum-plaster mixes, a

large number of samples were collected from different plastering jobs in Washington and their physical properties determined. Using the results obtained from these mixes as a guide, mixes will be prepared in the laboratory in an effort to improve the working qualities, sand-carrying capacity, etc.

The Effect of Age of Calcined Gypsum on the Linear Expansion of the Set Plaster—This investigation is a continuation of the work done by Porter[1] on the volumetric changes of gypsum. The phase studied most recently has been the determination of the effect of the age of the calcined gypsum on the linear changes of the set plasters, when subjected to humidity changes. The object of the work was to see if some light could not be thrown on the cause for the lack of adhesion of a gypsum-sand mix to a concrete base which is sometimes observed.

Test specimens were made using calcined gypsum and sand from sources representative of the entire gypsum industry. The specimens were allowed to dry for seven days and were then immersed in water. Expansion readings were made of the specimens and then the specimens were allowed to re-dry for seven days, after which another reading was made. Two sets of specimens were made, one from freshly calcined gypsum ($CaSO_4 \frac{1}{2} H_2O$) and another from the same samples after having aged in the laboratory for six months. Determinations were made upon the freshly calcined and the aged samples, of the calcined gypsum ($CaSO_4 \frac{1}{2} H_2O$) content.

From a study of the experimental results it was concluded that:

I. On exposure there is a gradual hydration of calcined gypsum ($CaSO_4 \frac{1}{2} H_2O$).

II. The percentage of water based upon the weight of dry material to bring the mortars to normal consistency was less with the aged samples of calcined gypsum.

III. For any particular sample of calcined gypsum a loss in percentage of calcined gypsum ($CaSO_4 \frac{1}{2} H_2O$) causes the plaster to expand or contract more when subjected to humidity changes.

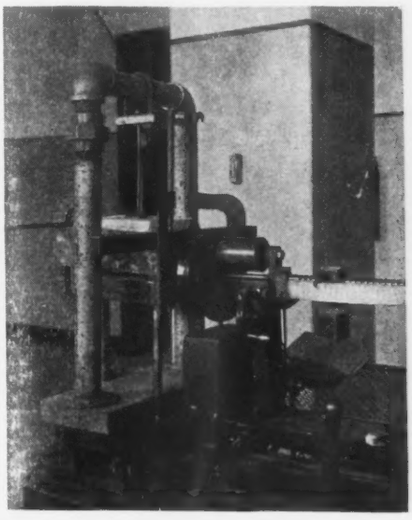
The Cause of the Acceleration in Time of Set of Machine Mixed Plasters—An investigation was undertaken to determine the cause of the acceleration in the time of set of gypsum mortars which often occurs when the mortars are made in mechanical mixers. A small mechanical mixer was built which was employed throughout the investigation.

It was found that mortars prepared in a mixer that was clean showed no appreciable acceleration in the time of set. It was also found that the rate and time of mixing had no effect on the time of set. However, when the mortars were prepared in a mixer containing small quantities of set gypsum there was a marked acceleration of the time of set but it was again noted that the acceleration was independent of the time and the rate of mixing.

Quantitative determinations were made of the acceleration of the time of set of gypsum plasters when different amounts of set gypsum were introduced into the mix. It was found that the time of set was greatly shortened by amounts of set gypsum up to 2%. Above 2% the acceleration was not so marked.

The Calcination of Gypsum—To evaluate the effect of the time and temperature of calcination and impurities on the properties of plaster, carefully sized gypsum has been calcined at different temperatures for various lengths of time. In addition some calcinations have been carried on in an electrically heated rotary dryer. The product obtained, when compared with kettle or rotary kiln calcined plaster, showed greater wet and dry volume, less density, less grit, required more mixing water to bring to a definite consistency, and gave a more plastic putty. The data indicate the desirability of trying out such calcination on a plant scale.

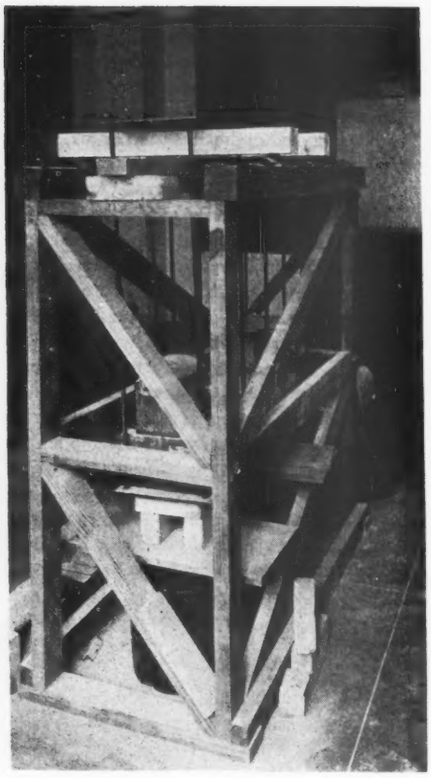
Strength of Bond Between Gypsum Plaster and Various Backings—The value of a finished job of wall plastering depends not only upon the qualities of the materials used as the plaster and backing, but to a very large extent upon the mutual adhesion of these materials to each other. An investigation therefore has been undertaken to measure the adhesion of gypsum plaster to all of the backings commonly employed in practice. The gypsum plaster was applied to specimens of the various backings and after



Showing method of testing the bond of gypsum plaster to backing

Chambers and apparatus used for measuring the rate of drying of plasters

[1] "Volumetric Changes of Gypsum," Proc. Am. Soc. for Testing Materials, 1923, pt. II.



Testing the elasticity of plasters

the plaster had aged for seven days it was pulled free from the backing and the force required to rupture the bond was determined and recorded.

The kinds of backings used can be divided into two general types: (1) Masonry and (2) laths. Masonry backings included: (a) Brick, (b) tile, and (c) concrete. Laths may be divided into: (a) Wooden lath, (b) metallic lath, (c) plaster board, and (d) wooden or metallic laths on a bituminous composition backing. The different backings were plastered with the recommended sanded-mixes of gypsum plaster of about ¾-in. grounds. The plaster was retarded so as to set in about 4 hours.

The size of the specimens of the various backings was about 12 in. x 14 in., and the area of the plaster was about 9 in. x 9 in. Embedded in the plaster was a mechanical device through which a force could be applied to pull the plaster from the backings. At the completion of the aging period, the specimens were put in a testing machine and a continually increasing force was applied to the device until the bond between the plaster and backings ruptured.

The results obtained in the tests indicate that there is a great difference in the values for the adhesion of gypsum plaster to different kinds of backings. The masonry backings, as a type, show far greater adhesion than do the laths. There is also a wide range of values within each type. With some of the masonry backings it was found that the adhesion of the plaster to the backing was almost equal to the cohesion of the plaster mix. With some of the lath backings it was found that the adhesion of the plaster to the backing was greater than the cohesion of the backing materials. The results show also very strikingly that the tenacity of adhesion depends to a large extent upon the character of the surface to be plastered. In the case of brick and tile it was found that the side of the brick wall or tile that was rough, or offered the better mechanical key, gave the greater adhesion. On the other hand the porosity or total absorption of the brick or tile does not seem to govern the adhesion.

Manufacture of Gypsum Products—The use of gypsum products has increased so rapidly that in 1924 an excess of four and one-half millions of tons of gypsum rock were mined. However, available information as to their manufacture is slight, so much so that the publication of a technologic paper of the bureau on this subject was deemed advisable and there has been prepared in manuscript form such a paper.

To obtain the data necessary for such a publication, twenty-five typical gypsum mills in the more important producing areas of the United States were visited and complete information obtained relative to the process of manufacture involved in the production of calcined gypsum and gypsum products; of the methods of mining or quarrying and crushing; of the methods of calcination, temperatures employed and the calcination period used; of the process of grinding, screening and packing; and finally of the methods of manufacture of products made from calcined gypsum.

The paper includes comparisons of the equipment employed and the processes followed in the mills visited and recommendations as to the most suitable layout and equipment for a given process.

Problems Relating to Both Lime and Gypsum

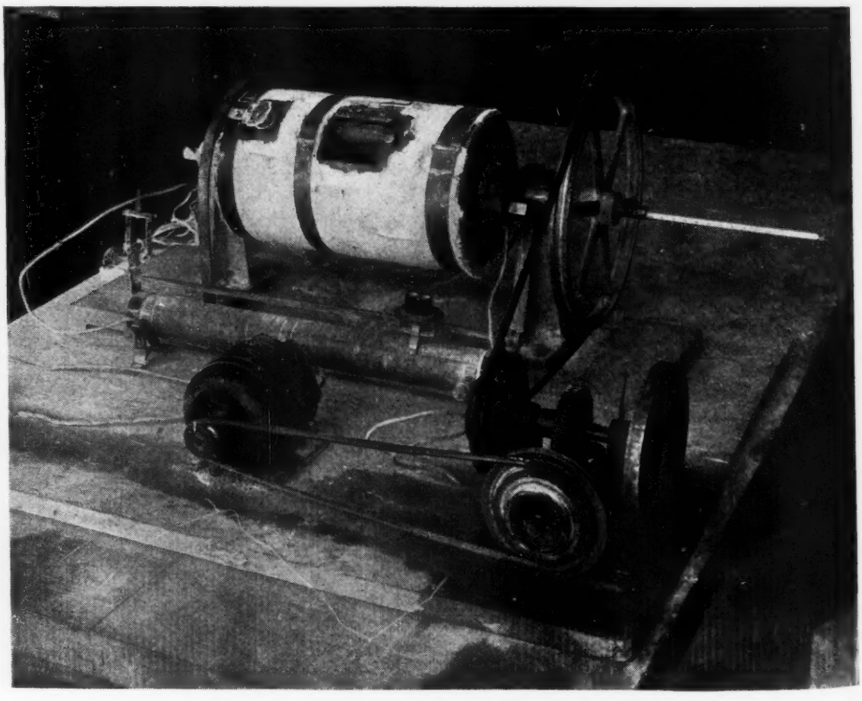
The Elasticity of Plasters—The first portion of this investigation, which has been completed, consisted in measuring the modulus of rupture of the various plasters used in interior decorative work. Specimens 3x3x30 in. were made of 1:2 and 1:3 lime plaster; neat, wood fibered, 1:2 and 1:3 gypsum plaster; 1:3 cement plaster; and a ready mixed magnesite plaster. Deflection determinations were made of these specimens under various loads up to rupture. From these data, moduli of rupture were calculated.

The following table gives the results obtained:

Plaster	Modulus of Elasticity	Modulus of Rupture lb. sq. in.
1:2 lime	208,800	29.4
1:3 lime	208,800	29.4
Magnesite	383,000	457.5
1:2 gypsum	772,000	391.5
1:3 gypsum	549,000	262.5
Gypsum wood fiber	538,500	289.0
Gypsum neat	916,000	475.0
1:3 cement	524,000	252.0

The second part of the work consists in subjecting specimens made from the same materials to a fraction of their respective breaking loads and observing the time elapsing before fracture of the beam occurs. To date it was found that a 1:3 gypsum plaster, of the size specimen mentioned, will sustain 5/6 of its breaking load for approximately four months. (View of testing machine opposite.)

Rate of Drying of Wall Plaster—In the decoration of plasters, it is the consensus of opinion that for a satisfactory job the plaster should be dry, or almost so. The question then arises as to when is a plaster dry. Under the conditions of practice the dryness of a plaster is a relative term only



Laboratory electrical calciner for gypsum

and means it is in such a state of dryness that under the existing conditions there is no further evaporation of water from the plaster into the surrounding air. This study was therefore undertaken to determine when a plaster may be satisfactorily decorated consideration being given to the temperature, humidity, and circulation of the surrounding air.

The rate of drying of gypsum, lime, and cement plasters, of the usual compositions and finishes in ½-in. and ⅞-in. grounds, is being determined at different temperatures and humidities, using the same rate of circulation of the surrounding air.

To date the rate of drying of gypsum, lime and cement plasters of both the sand-float and white finishes in ½-in. and ⅞-in. grounds has been determined at 37 deg. C., exposed to a dry air flow of 80 cu. in. per minute. Most of these plasters have been dried also at 37 deg. C., exposed to very humid air flow of 80 cu. in. per minute. A few of the plasters have been dried at 22 deg. C., exposed to very humid air of the same velocity.

The results obtained indicate that the rate of drying of all plasters is slower than has been believed. With the higher temperatures and with dry air the plasters require from 48 to 120 hours to dry after the final coat is applied. The rate depends upon the kind of plaster used as well as upon the thickness. Cement plasters dry the most rapidly, gypsum next and lime plasters the slowest. With the lower temperatures and with humid air the rate of drying of the plasters is very slow indeed, some requiring five weeks to dry under these conditions. (A view of the drying chambers in which plasters are being dried is shown on the preceding page.)

Problems Relating to Sand-Lime Brick

The Bond of Mortar to Sand-Lime Brick—In order to evaluate the different factors involved in the adhesion of mortars to brick, some tests were made of the physical properties of 1100 sand-lime brick. These were grouped according to their total absorption and rate of absorption and the adhesion of a 1:3 cement mortar determined. The results showed that the absorption of a brick is a very important factor since the larger amounts of water in the more absorbent brick permit of obtaining a greater bond. This value was highest when about 13% water was present in the brick, larger amounts seeming to prevent the absorption of the cement from the mortars by the brick and consequently giving lower results.

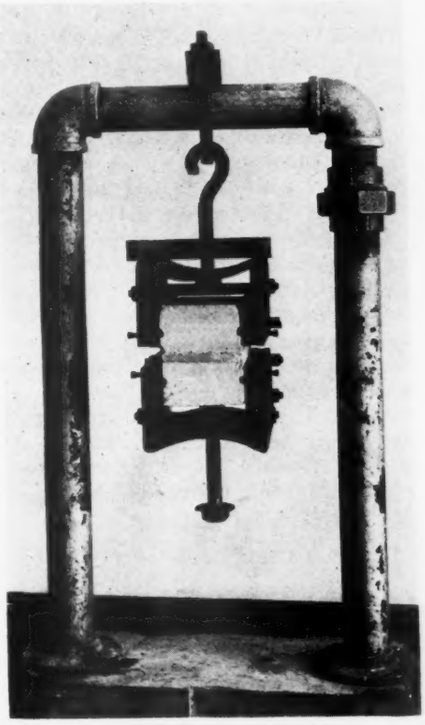
Other Activities

Federal Specifications Board—During the year the following specifications have been prepared and promulgated as master specifications by the board: Gypsum wall board, gypsum plaster board, quicklime for structural purposes, hydrated lime for structural purposes, calcined gypsum, gypsum plasters.

All of the above mentioned specifications have been published as circulars by the bureau and may be obtained from the Superintendent of Documents, Washington, D. C., at five cents per copy.

At the present time the board has before it for consideration, specifications for sand-lime brick, lathing and plastering, and gypsum partition tile.

The Interdepartmental Conference on Chemical Lime—The activities of the Interdepartmental Conference on Chemical Lime during the year include the publication of three specifications covering lime for the following purposes; the absorption of carbon dioxide in the purification of gases, the manufacture of sugar and the manufacture of calcium arsenate. Copies of these specifications may be obtained from the Superintendent of Documents, Washington, D. C., at a cost of 15 cents each. A number of other specifications are in preparation, and include those for lime for use in the purification of water, the manufacture of leather and in the manufacture of soap.



Apparatus for testing the mortar bond of sand-lime brick

Publications—The following publications and articles have been issued during the year:

Lime

Circular No. 189, Recommended Specifications for Quicklime and Hydrated Lime for Use in the Absorption of Carbon Dioxide.°

Circular No. 207, Recommended Specifications for Limestone, Quicklime and Hydrated Lime for Use in the Manufacture of Sugar.°

Circular No. 203, Recommended Specifications for Lime for Use in the Manufacture of Calcium Arsenate.°

Circular No. 204, U. S. Government Master Specification for Hydrated Lime for Structural Purposes.°

Circular No. 201, U. S. Government Master Specification for Quicklime for Structural Purposes.°

Plastering Sands for Lime, Gypsum and Cement, by H. V. Johnson, Rock Products, March 23, 1925.*

Gypsum

Circular No. 205, U. S. Government Master Specification for Gypsum Plasters.°

Circular No. 211, U. S. Government Master Specification for Gypsum Wall Board.°

Circular No. 210, U. S. Government Master Specification for Gypsum Plaster Board.°

Circular No. 206, U. S. Government Master Specification for Calcined Gypsum.°

Plastering Sands for Lime, Gypsum and Cement, by H. V. Johnson, Rock Products, March 23, 1925.*

Getting Rid of Efflorescence on Gypsum Plaster, by F. C. Welch, *Chemical and Metallurgical Engineering*, August 18, 1924.*

Properties of Gypsum Tile, by J. M. Porter, Proceed. A. S. T. M., pt. I, 1924.**

Effect of Composition on Some Properties of Gypsum Plasters, by F. C. Welch, Rock Products, Nov. 15, 1924.*

Some Modern Gypsum Products, by J. M. Porter, *Chemical and Metallurgical Engineering*, May, 1925.**

Effect of Storage of Calcined Gypsum on Linear Expansion of Plaster, by L. E. Smith, Rock Products, Oct. 3, 1925.*

Miscellaneous

Work of the Bureau of Standards in 1924 on Lime, Gypsum and Sand-Lime Brick, Rock Products, Dec. 27, 1924.

Gypsum Gaining in Favor as a Fertilizer

THE State of Washington Experiment Station has recently completed tests on crops grown on gypsum treated land. They found that worn-out lands were restored to life on gypsum treatment. Wheat diseases were greatly reduced and greater yields of better milling quality were grown on gypsum treated soils. It is claimed by the station that the gypsum furnishes the necessary sulphur to the soil to replace that lost by drainage and cropping of legume and mixed hay. Application of land plaster (gypsum) puts the soil in better condition; it acts as a flocculent or deflocculent, depending on the nature of the soil. Increased yields of legume hays with higher protein value result.

A recent bulletin published by the University of Idaho recommends the use of gypsum for seep and alkali lands. Former experiments by the U. S. Department of Agriculture demonstrated the efficiency of gypsum in counteracting the effects of the so-called black alkali.

Many of the diseases of farm stock are due to shortage of lime and sulphur in the forage. One authority states that gypsum has been used with great success as a cure and preventive of tuberculosis in cattle. German authorities make the statement that foot and mouth disease is not apt to occur where gypsum is used in the stable and feed yards.

°Indicates publication may be obtained from the Superintendent of Documents, Washington, D. C., at 5 cents per copy.

*Indicates request should be made to publishers of journal in which article appeared.

**Indicates reprint of article is available upon application to the Bureau of Standards.

Lubrication of Rock Products Machinery*

Results of the First Comprehensive Study of Lubrication in an Industry That Consumes Millions of Pounds of Oil and Grease

THE rock products industry is distinctive for the magnitude of its output, the size and capacity of the machinery involved, and the extensive field which it covers. To appreciate its importance in the furtherance of industrial progress an encyclopedia of the uses to which the respective products can be put would be necessary. Some 27 different substances are involved; chief among these are crushed stone, granite, shale, limestone, sand, gravel, phosphates, feldspar, sandstone, marble and slate.

The total power required for the operation of rock products equipment is above 2,000,000† h.p. It comprises steam, electricity and the internal combustion engine; the first two predominating to a large extent. To serve these prime movers and the other miscellaneous equipment involved, such as crushers, steam shovels, excavators, screens, skips. washers, etc., approximately 12,230,000 gal. of oil, and 12,120,000 lb. of grease are required per year, at a probable cost of about $6,100,000. On a unit basis, this would amount to approximately 6.0 gal. of oil and 6.0 lb. of grease per h.p., at a total estimated cost of $3 per h.p. per year.

From a comparative point of view, these figures are of vital interest to the management of rock products plants. Too, they are complimentary to the industry as a whole, when we take into consideration the inherent difficulties which accompany the attainment of effective lubrication. It is a heart-breaking task to attempt to lubricate a steam shovel, screen, crusher or conveyor. Weather conditions, dust, abrasive matter, moisture and oftentimes chemical fumes tend to counteract the friction-reducing ability of practically any lubricant; and it is almost an impossibility to operate under any other but these conditions. In this article the machinery used in the industry will be taken up in detail and the most efficient methods of lubrication discussed.

Excavating Machinery

Steam Cylinders—In the steam-driven machine, perhaps the most important detail is the lubrication of the steam cylinders. In the operation of practically any type of excavating machine, which may be steam driven, the existing conditions will be such that if any but a high grade, properly compounded lubricant is used, the cylinders will suffer accordingly.

The low-pressure steam used by this equipment has a high moisture content which will materially affect the cylinders unless they are covered with a lubricant of sufficient film tenacity. Lime condensation and steam leakage are another source of moisture. Scoring, abnormal wear, frictional losses, steam leakage past piston rings, chattering of valves, etc., are due to improper selection of a lubricating medium. The proper lubricant is a grade of steam cylinder oil which contains a sufficient amount of high grade animal or fixed oil to promote the formation of an extremely adhesive film of emulsified lubricant, which will adequately resist the washing action of any water that may be present. To insure the best results, the base of this lubricant should be a medium viscosity, highly adhesive, steam cylinder stock. For this purpose a comparatively high compound cylinder oil ranging in the neighborhood of 130 seconds Saybolt viscosity at 210 deg. F. will in general meet the variable requirements involved.

The lubricant should be delivered by a positive feed lubricator, via suitable atomizers. It is possible to use either hydrostatic lubricators or mechanical devices for this purpose.

Motor Bearings

Automatic lubrication is generally regarded as most satisfactory, the lubricant being furnished from internal reservoirs located in the treads and rollers. For this service the engine oil mentioned below will in general meet the requirements.

On certain types of shovels and other excavating machinery, journal boxes packed with wool waste which has been saturated with mineral oil serve satisfactorily as lubricators.

As a rule other wearing parts on the average excavating machine can be taken care of by means of a medium viscosity straight mineral oil ranging from 300 to 500 seconds Saybolt viscosity at 100 deg. F. or by a high grade of cup grease. Many builders equip their machines for grease lubrication. The product used for this purpose should be free from acid or alkali and should contain no filler such as talc or asbestos which would tend to clog the oil ways.

Oil of 180 to 200 seconds viscosity is best suited for the bearings of electric driven machines. Sight feed oil cups are best for parts to be oiled by hand.

Internal Combustion Engines

Power shovels and scrapers operated by oil, kerosene, or gasoline engines are best lubricated by some form of circulating lubricating system, the oil passing either through a hollow crank shaft under adequate pressure to reach all the wearing parts or being splashed by the connecting rods, etc. On oil and gasoline engines a straight mineral engine oil from 300 to 750 seconds Saybolt viscosity at 100 deg. F. will be applicable, the grade selected being dependent upon the weather and operating temperatures. For tractor type engines a somewhat heavier lubricant should be used.

Gears, Chains and Wire Rope

Other wearing parts which also will in all probability present lubricating problems on the average excavating machine are the gears, chains and wire rope. The external surface of wire rope should be treated at frequent intervals with a suitable lubricant and preservative which is capable of penetrating to the innermost strands during operation, not only re-lubricating the core but as well preventing wear at the points of contact of the strands.

In order for a lubricant to adequately meet these conditions it must be—

1. Capable of being readily applied in a thin, uniform film without undue heating.
2. Free from acid and alkali.
3. Plastic at all temperatures.
4. Non-evaporating.
5. Non-hardening.
6. Insoluble and resistant to water.
7. Capable of resisting the entry of dust, dirt and other foreign matter.
8. Adhesive and tenacious enough to insure that it will not run off or drip under abnormal pressures or temperatures.

The most generally suitable lubricant to meet these conditions is a pure petroleum product having a viscosity of from 1000 to 2000 seconds Saybolt at 210 deg. F. This lubricant is also applicable to gears and chains on the average rock products excavating machine.

To attain the best results in applying the gear lubricant the surfaces of all teeth should first be washed with kerosene or some other solvent, the lubricant then being heated and brushed or poured lightly onto the wearing surfaces while the gears are in slow rotation.

Crushers and Breakers

Lubrication of such equipment is essentially confined to the bearings of the pitman and eccentric shaft.

Grease is usually the most generally adaptable lubricant, being applied to the bearing

* Abstracted from *Lubrication*, September, 1925, Texas Co., N. Y.

† Based on statistics compiled by Rock Products.

either by means of pressure lubricators or via reservoirs equipped with wool waste or some other form of pad retainer to insure positive lubrication without undue loss. Where pressure lubrication is employed a compression cup grease will usually be most adaptable. The use of wool waste or pad lubrication, however, will require a thinner grease, relatively fluid in consistency, in order to enable proper penetration of the wool.

Eccentric bearings likewise require positive lubrication with a suitable grade of grease usually heavier than that for the pitman bearings. Sliding friction at the toggle seats are served best by a heavy machine oil lubrication system.

Gyratory crushers can be taken care of by automatic pressure lubrication, equipped with oil filter systems, using an oil of 140 seconds Saybolt viscosity at 210 deg. F. In cold weather lower viscosity oil to be used. Top bearings, suspension and wearing rings need crusher oil of about 200 seconds Saybolt viscosity at 210 deg. F. over the usual wool waste packing.

Ball, Tube and Rod Mills, Etc.

Such machines require medium greases or heavy lubricants. Heated bearings should be flooded with oil. Engine oil of 200 seconds Saybolt viscosity at 100 deg. F. is best. The gears of the mills are best served with 1000 seconds Saybolt at 210 deg. F. Crushing rolls require medium grade grease on compression cup lubricants. The gearing of the rolls function best with fairly heavy bodied gear lubricant, care being taken to avoid excess or too heavy a product because of dust accumulation paste formed being thrown off during operation.

Screens

The driving ends are best lubricated by grease, due to its ability to maintain a more effective seal against entry of abrasive foreign matter. It must be a product insoluble in water, however, due to the possibility of its having to withstand the washing action of rain, or any water used during screening. As a rule, a cup grease of medium body or consistency will be best suited to these conditions.

For the gears (including girth gears wherever installed) a lubricant must be used which will not only form a protective film to counteract the abrasive effect of dust, dirt, etc., but will function irrespective of temperature, moisture, or weather conditions. Experience has proved that a straight mineral residual product of a viscosity of approximately 200 seconds Saybolt at 210 deg. F. will adequately serve the purpose. On the other hand, high temperatures might require a higher viscosity of say 1000 to 2000 seconds Saybolt.

An advantage possessed by heavier lubricants, however, is their highly adhesive characteristics and their capability of resisting the effects of centrifugal force under higher speed conditions provided they are sparsely applied.

In the case of vibrating screens the grease lubrication has been found to be very satisfactory on such equipment, affording the requisite protection to the various bearings by preventing the entry of dust and dirt. In such equipment a medium bodied compression cup grease will be suitable.

In brief, the lubrication of rock products machinery becomes a matter of—

1. Using clean, properly refined lubricants.
2. Designing wearing surfaces and lubricators as nearly oil-tight and dust-proof as possible.
3. Changing lubricants at frequent intervals and—
4. Maintaining all parts to be lubricated, as clean and free from foreign matter as is consistent with operating conditions.

Rough conditions should not be accepted as inevitable. Nor should the matter of lubrication and lubricants be regarded in too casual a manner. It is the best and most decided means of keeping machinery operating and increasing production.

How the Bethlehem Steel Corporation Helps Employes to Own Homes

HOMES valued at $13,000,000 have been purchased by 3,400 employes of the Bethlehem Steel Corp. under the company's home-owning plans, according to the current issue of the *Bethlehem Review.*

Commenting on building and home ownership activities, President E. G. Grace says:

"Building and construction activities in this country absorb nearly one ton in every five of the production of iron and steel, being exceeded in steel consumption only by the railroad industry. Building operations interest us not only because they thus provide an important part of the steel market and affect the steadiness of our operations, but also because of their connection with the desire each of us has to own a home.

"Increased buying power during the past ten years has made it possible for people in this country to realize to an increasing extent the desire to own their homes. Home building has accounted for nearly one-half of building operations during the past year. It is not only a question of housing but of more and better housing. A demand has grown for additional space, for modern conveniences, for room for gardens and space for children to play in safety. New houses have been and will be required to meet this demand.

"All of these activities have given a background to general prosperity and have had a stabilizing effect on industry. The conditions are of such a fundamental nature that building activity with its accompanying demand for steel products and other manufactured goods of all kinds should continue for some years to come."

Bethlehem's employe housing activities have developed into a general plan which is in operation, with certain modifications, at the company's major plants. It is administered by a real estate organization at each of these plants and includes among its activities the improvement of existing houses owned by the company, the construction of new houses at plants where housing was inadequate or where other conditions made such housing necessary, and aid to employes in the purchase or erection of homes.

Several of the distinctive and unusual phases of Bethlehem home building plans are:

(a) Free architectural, engineering, financial and legal assistance and advice.

(b) Employe receives full title to property at once. He is under no obligation to the company and can work where he pleases and dispose of his property as he wills, as long as monthly payments are maintained.

(c) A life insurance policy at low rates (about one-third of the usual premium) without any medical examination, is taken out on each home builder or purchaser during the term of his indebtedness, fully protecting his dependents, as far as their home is concerned, in the event of his death.

(d) Proper provision is made for paying off the mortgage indebtedness through monthly payments, which are a little higher than local rents.

While the company has given encouragement in every way to home ownership on the part of employes, its work has been directed toward helping the employe to provide for himself and not in tying up any considerable amount of its own money in assisting employes to own their own homes.

Local financial institutions co-operate with the company to furnish money on first mortgages. The company then need only advance the difference between such mortgage and the initial cash payment of the employe. Usual rates of interest are charged and the employe, of course, pays the same title examination fees, recording fees and carrying charges, such as insurance, taxes, etc., as he would have to pay if he built and financed his own home.

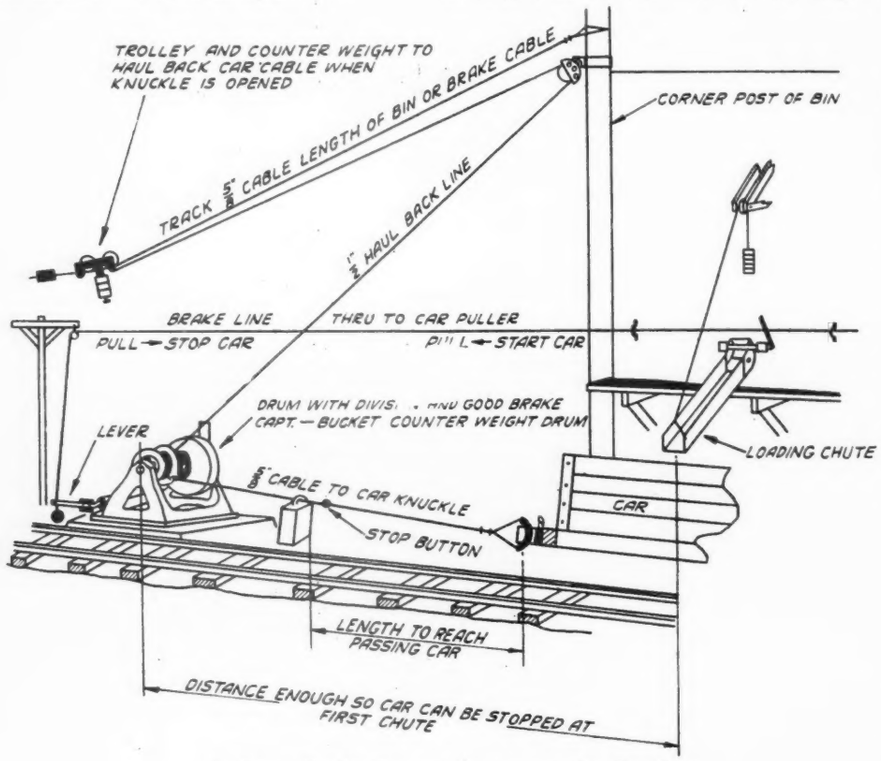
Bethlehem's management believes that home ownership makes for better, happier and more settled citizens and employes, and as a result both the home and the company are benefited.

Hints and Helps for Superintendents

A Car Spotter

By C. O. GRANGER
Superintendent, Robins, Young Co.,
New London, Minn.

WE find this brake drum a great help for the loader; he does not have to wonder whether brakes on the cars are in such shape that they will stop the car just where he wants it or whether they won't release when he wants to move the car again.



A clever device for spotting cars at loading bins

Above the loading chutes, within reach, a half-inch rope runs from the level on the brake drum to the operating lever on the car mover, which is a friction machine, and by pulling on the rope the loader may move the car ahead and by pulling in the opposite way he can stop the car at any point desired. This brake saves one or two men, and we find our cars loaded more evenly; it also prevents cars running away half loaded and a man getting hurt trying to stop them by blocking or otherwise.

(The sketch shows the line from the car coupler winds on the left-hand drum and the line from the counter-weight on the other drum. The cut does not show this as clearly as it should.—Editor.)

Automatic Switch Thrower

THE simple manually-operated track switch at the quarry of the Iowa Limestone Co., Alden, Iowa, described in our "Hints and Helps," July 25 and August 22, 1925, aroused about as much interest as any labor-saving device we have described in these columns. It was so simple any one could make it in a jiffy.

The device illustrated and described herewith is a much more complicated device, but it is automatic in operation. The view and accompanying description (from the *Engineering and Mining Journal-Press*) does not go into the details of construction, but the idea is clear, and a good mechanic could readily work out the details of cams and levers necessary to accomplish the purpose. The description is as follows:

In an effort to increase efficiency and lessen accident risk, a mining company in West Virginia has installed an automatic switch thrower at the turnout to a by-pass track on the main outside tram road leading to the tipple. By means of the thrower the motormen are able to control the movements of their locomotives over, into, or out of the switch, and in this respect the switch is made selective.

But it is in the changing of positions by the locomotives from the front to the rear end of a trip so as to simplify the movements in backing the cars to the tipple that this device serves its greatest usefulness in this installation. This shifting operation is performed by the motorman without any aid from the trip rider, who thus avoids the danger of jumping from a moving locomotive—a customary practice where a hand-operated switch is employed.

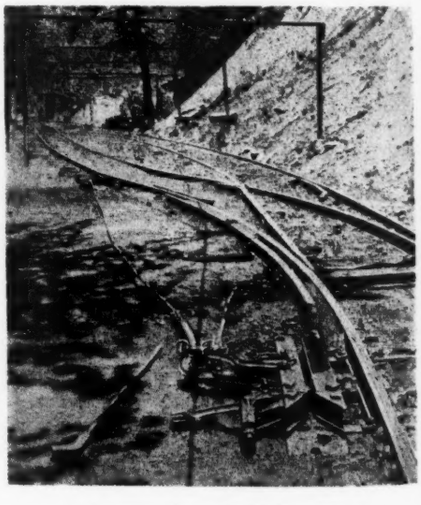
In the accompanying illustration are seen the essential details of the switch thrower. These are designated as the "tripping device" and the "switch thrower." In addition, bolted to one side of each tram locomotive is a lever mechanism called the "traveler."

A locomotive moving on the right-hand or main track on its way to the tipple with a trip of coal cuts loose from the cars in the clear of the frog, and alone crosses over the frog and switch. In doing so the traveler on the locomotive is depressed by the motorman to pass through the guides and engage a finger-like lever on the switch thrower which opens the switch behind the locomotive.

The locomotive being in the clear of the switch which is now open reverses its direction, passing through the switch and onto the by-pass track. A short distance beyond the frog on the by-pass track is the tripping device, which likewise is engaged by the depressed traveler, closing the switch. The locomotive continues in motion, passes the standing trip on the main track, goes through a spring latch at the far end of the by-pass track, and pulls up at the rear of the trip, which it then backs to the tipple.

Switch Works Automatically

When a loaded trip comes up on the right-hand track, the locomotive cuts off and proceeds forward through the switch, lowering a "traveler" bar into the slot in the switch thrower (foreground). This throws the switchpoint so the motor can back into the



Automatic switch thrower

by-pass track. When the "traveler" engages the tripping device beside the rail in the middle background, the switch is closed. The motor then runs around the trip and pushes it to the tipple.

Ventilating the Interior of a Dredge Hull

THE interior of a dredge hull is usually damp from condensation. The water outside is cooler than the air and when there is much humidity the moisture condenses on the cooler timbers. This moist condition is just right to promote the growth of the fungi that cause rot in timbers.

Painting the hull on the inside is a preventative, but if the paint gets scarred or scratched the wood is exposed and a chance for rotting occurs. It is better to ventilate the dredge hull (even though the inside is painted) in such a way that the moisture is removed by evaporation. This will keep the timbers sound and "sweet."

The picture shows the method used on the dredge of the P. Koenig Coal Co., at Oxford, Mich., for ventilating the hull. Two ventilators with revolving heads are placed on the deck of the dredge. They work whenever there is any breeze at all and they draw air through the space below the deck. These ventilators are placed well forward and hatches at the stern permit fresh air to enter.

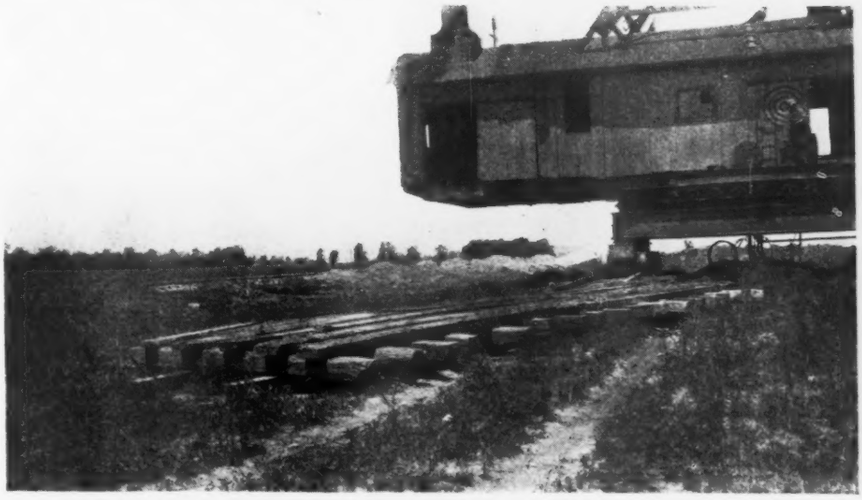
Examination of the timbers and planking on this dredge showed them to be almost free from moisture although the weather was hot and humid and it had been so for days before the examination was made.

An ordinary electric fan would do the same work very well, but it should be set to blow air into the hull instead of sucking it out as these ventilators do. A box over the fan would protect it and direct the air into the space below the deck.

Ventilator for dredge hull

Shifting Dragline Tracks Made Easy

Dragline track built in sections so that it may be shifted in units

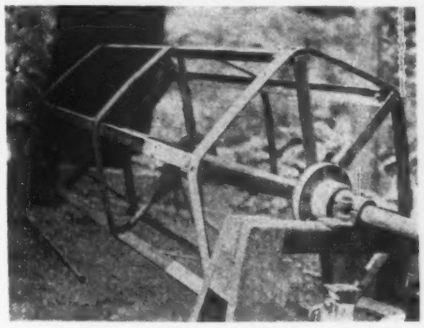


Bottom of track unit showing ties spiked to planking—Chicago Gravel Co. operation

Frame for a Hexagonal Screen

HEXAGONAL screens seem to be "coming back" as a ROCK PRODUCTS editor believes from having seen them in two recently built plants. For fine screening they have some advantages over the cylindrical or conical screen. One of these is that the screen cloth is put on in flat panels which are framed. The panels are put on and taken off as a unit which makes it a short job to change a broken screen.

The view herewith shows the frame for a hexagonal screen under construction and the way it is made from angle irons. And flat iron is clearly indicated. The wooden frames to which the screen cloth is tacked are not shown. These, however, are bolted to the outside faces of the angles and the flat iron through holes which will be drilled for that purpose. The picture was taken at the plant of the Clay County Crushed Stone Co., Birmingham, Mo.



Frame for hexagonal screen

Financial News and Comment

Developments in North American Cement Corporation

A REPORT from the *Baltimore (Md.) Sun* states that applications for the recent $6,000,000 bond issue (Series A debentures, 6½% of the newly formed North American Cement Corporation aggregated to three times the amount available.

Preferred Stock Offered

R. F. Devoe & Co., Inc., New York, are offering for public sale the recent authorized 7% cumulative preferred stock issue of the North American Cement Corp. The total value of the stock is $1,220,000 in shares of $100 par value. Price to buyers is at 99 with a bonus of 1 share of common given with every 2 shares of preferred.

Directors of North American Cement Corp., at their meeting held recently, declared a dividend on the preferred stock covering the two months' period ending October 31, 1925, at the rate of 7% per annum, payable November 1.

Arundel Earnings

THE ARUNDEL CORPORATION, producers of sand and gravel, Baltimore, Md., reports the following earnings for 1925 compared with 1924: Net profits, month of August, 1925, $177,681; month of August, 1924, $215,794. Eight months ended August 31, 1925, $1,121,488; eight months ended August 31, 1924, $1,077,109.

International Cement Common Moves Up

THE PRICE of International Cement common (no par stock) shows a steady rise for 1925. The price in quarterly periods for 1925 was as follows: January 5, 52 (low for the year); March 16, 55; June 27, 63; September 30, 81½ (high for the year). Present price is around 77. In 1924, the stock reached its lowest period in April when it sold for 40¾ and its highest, 59½, in November. The present rate of dividends is $4 per share (no par).

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	Oct. 26	100	143	150	1¾% quar. Sept. 1
Alpha Portland Cement Co. (preferred)**	Oct. 24	100	110	.....	1½% quar. Sept. 1
Arundel Corporation (sand and gravel—new stock)	Oct. 26	No par	36½	37	30c quar. Oct. 1
Atlas Portland Cement Co. (common)	Oct. 28	No par	57	57¾	50c quar.
Atlas Portland Cement Co. (preferred)	.....	100	.....	.....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)**	Oct. 24	33⅓	45	.....	2% quar. Oct. 1
Bessemer Limestone and Cement Co. (common)‡	Oct. 26	100	132	133	1½% quar. Oct. 1
Bessemer Limestone and Cement Co. (preferred)‡	Oct. 26	100	105½	106½	1¾% quar. Oct. 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	Oct. 26	.....	111	125	8% annual
Boston Sand and Gravel Co. (common) (d)	Oct. 26	100	70	70	2% quar. July 1
Boston Sand and Gravel Co. (preferred) (d)	Oct. 26	.....	.....	80	1¾% quar. Oct. 1
Boston Sand and Gravel Co. (1st preferred) (d)	Oct. 26	.....	.....	90	2% quar. Oct. 1
Canada Cement Co., Ltd. (common)	Oct. 28	100	106½	107	1½% quar. Oct. 16
Canada Cement Co., Ltd. (preferred) (f)	Oct. 24	100	115	.....	1¾% quar. Nov. 16
Canada Cement Co., Ltd. (1st 6's, 1929) (f)	Oct. 24	.....	102	103	3% semi-annual A&O
Charles Warner Co. (lime, crushed stone, sand and gravel)	Oct. 26	No par	22	25	50c quar. Oct. 10
Charles Warner Co. (preferred)	Oct. 26	100	98	102	1¾% quar. Oct. 22
Dolese and Shepard Co. (crushed stone) (a)	Oct. 28	50	52½	55	1½% quar.
Giant Portland Cement Co. (common)**	Oct. 24	50	38	42	
Giant Portland Cement Co. (preferred)**	Oct. 24	50	53	57	3½% semi-ann. June 15
Ideal Cement Co. (common)‖	Oct. 28	No par	65	75	$1 quar. June 30
Ideal Cement Co. (preferred)‖	Oct. 7	100	107	109	1¾% quar. June 30
International Cement Corporation (common)	Oct. 28	No par	75	75¾	$1 quar. Sept. 30
International Cement Corporation (preferred)**	Oct. 26	100	104	105½	1¾% quar. Sept. 30
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Kelley Island Lime and Transport Co.	Oct. 27	100	115	120	2% quar. Oct. 1
Lawrence Portland Cement Co.**	Oct. 24	100	110	.....	2% quar.
Lehigh Portland Cement Co.‖	Oct. 24	50	88	91	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially up to 1930) (k)	Oct. 23	100	100	101	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially from 1930 to 1935 (k)	Oct. 23	100	97	98½	
Michigan Limestone and Chemical Co. (common)‖	Oct. 22	.....	23	25	
Michigan Limestone and Chemical Co. (preferred)‖	Oct. 22	.....	23	25	1¾% quar. July 15
Missouri Portland Cement Co.	Oct. 28	25	69	69½	50c quar.; 25c ex. Aug 1
Missouri Portland Cement Co. (serial bonds)	May 29	.....	104½	104½	3¼% semi-annual
Monolith Portland Cement Co. (common) (c)	Oct. 6	.....	8¼	8¾	
Monolith Portland Cement Co. (units) (c)	Oct. 6	.....	22¾	24¼	
Monolith Portland Cement Co. (preferred) (c)	Oct. 6	.....	7¼	7¾	
New England Lime Co. (Series A, preferred) (i)	Oct. 24	100	96½	99	
New England Lime Co. (Series B, preferred) (i)	Oct. 24	100	96½	99	
New England Lime Co. (V.T.C.) (i)	Oct. 24	.....	23	25	
New England Lime Co. (6s, 1935) (m)	Oct. 26	100	97½	100	
North American Cement Corp. 6½s 1940 (with warrants)	Oct. 24	.....	98½	98¾	
North American Cement Corp. (preferred)	Oct. 24	100	.....	.....	2 mo. period at rate of 7%
Olympic Portland Cement Co. (g)	Oct. 13	.....	.....	£1⅝	
Pacific Portland Cement Co., Consolidated ($)	Oct. 24	100	88	89	
Pacific Portland Cement Co., Consolidated (secured serial gold notes)§	Oct. 24	.....	99¾	100½	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	Oct. 26	10	6	6½	
Petoskey Portland Cement Co.*	Oct. 26	10	9¼	9¾	1½% quar.
Pittsfield Lime and Stone Co. (preferred)	.....	100	.....	.....	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred) (d)	Oct. 26	100	.....	98	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred) (d)	Oct. 26	100	.....	70	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common) (d)	Oct. 26	No par	.....	70	1½% quar. Nov. 2
Sandusky Cement Co. (common)*	Oct. 27	100	106	112	2% quar. July 1
Santa Cruz Portland Cement Co. (bonds) ($)	Oct. 24	.....	104½	106	6% annual
Santa Cruz Portland Cement Co. (common) ($)	Oct. 10	50	72½	73½	$1 April 1
Superior Portland Cement Co.	Mar. 1	100	.....	120	
United States Gypsum Co. (common)	Oct. 28	20	197	198	2% quar. Sept. 30; $1 ex. Sept. 15
United States Gypsum Co. (preferred)	Oct. 28	100	117	117½	1¾% quar. Sept. 30
Universal Gypsum Co. (common)†	Oct. 28	No par	20½	23	
Universal Gypsum V. T. C.†	Oct. 28	No par	19	22	
Universal Gypsum Co. (preferred)†	Aug. 5	.....	76	.....	1¾% quar. Sept. 15
Universal Gypsum Co. (1st mortgage 7% bonds)†	Oct. 28	.....	99	(at 6½%)	
Wabash Portland Cement Co.*	Aug. 3	50	60	100	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940) (o)	Oct. 26	100	98½	100	
Wolverine Portland Cement Co.	Oct. 26	10	9½	10⅜	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Bauer, New York. †Quotations by True, Webber & Co., Chicago. ‡Quotations by The Valley Investment Co., Youngstown, Ohio. §Quotation by Freeman, Smith & Camp Co., San Francisco, Calif. ‖Quotations by Frederic H. Hatch & Co., New York. (a) Quotations by F. M. Zeiler & Co., Chicago, Ill. (b) Quotations by De Fremery & Co., San Francisco, Calif. (c) Quotations by A. E. White Co., San Francisco, Calif. (d) Quotations by Lee, Higginson & Co., Boston, Mass. (f) Nesbitt, Thomson & Co., Montreal, Canada. (g) Neidecker and Co., Ltd., London, England. (i) E. B. Merritt & Co., Inc., Bridgeport, Conn. (k) Peters Trust Co., Omaha, Neb. (m) Second Ward Securities Co., Milwaukee, Wis. (o) Central Trust Co. of Illinois, Chicago, Ill.

Editorial Comment

An Editorial By a Reader

A loyal friend and reader of ROCK PRODUCTS sent us a letter for our Hints and Helps for Superintendents department. Perhaps it belongs there, but it contains so many real good, wholesome suggestions for all of us that we are going to give it the dignity of an editorial. May we add that we would like to lend our editorial pages to other readers who have thoughts and suggestions for the "good of the order." Our correspondent is La Fay Pace, plant superintendent of the Umpqua Gravel Co., Gardiner, Ore. His "Hint" follows:

"I feel a bit reluctant in answering your letter or at making an attempt to give any useful hints to my partners in this great struggle to supply present demand for a building program which is nation-wide, and of such stupendous proportions that not many of us have the faculty of fully realizing its immensity, but here are some of my general ideas for a foreman or superintendent to take note of.

"First of all comes loyalty to your employers, even though your ideas may not be always in harmony with theirs, be loyal; be compromising with your ideas. Sometimes the man with the white collar and good clothes may be an old pioneer in the very line of work you are following; so I repeat, be loyal. And along with your loyalty be progressive, study new ways and new possibilities.

"If you have the opportunity, put some of your ideas to work, and do a little experimenting. It not only gives you self-confidence, but it helps your workmen to be progressive.

"And now last but not least, be considerate of your men under you. You will not be surprised if they have problems of their own; be sympathetic; and if they show progressive ideas encourage them.

"I learn something every day from my men, and yet never concede too readily to anyone's snap judgment, and so I have found it pays to take a personal interest in employes. Give them responsibility, they appreciate it. It makes them better men.

"Only yesterday in trying out a new screening operation I said to the man in charge of that unit: 'Now here is a new operation that requires considerable study, and maybe some changes to make it a success, I am looking to you for results,' and with a little general supervision we accomplished our objective; and so goes the day's work. Maybe some day that man will be a superintendent and you may be wearing a white collar, and be directing a business of your own; and if you are a success, I wager you will look back and sum up your success in the words 'Service, Loyalty and Personal Consideration.'"

A Busy January

January 12 to 17, 1926, is the week of the Good Roads Show in Chicago. As usual, we expect, this will attract many readers of ROCK PRODUCTS. It has become a real national institution for an exchange of views on engineering and contracting in connection with highway building. It is a great national fair or mart for machinery and equipment used in road-building. Manufacturers, yearly, make special efforts to crown their past year's developments in new machinery by their exhibition for the first time at these Good Road Shows.

The week following the Good Roads Show the sand and gravel producers will assemble at the Biltmore Hotel in Atlanta, Ga., and the crushed-stone producers at the Mount Royal Hotel, Montreal, Que. Every indication is that these will be record-breaking conventions. Sand and gravel producers are promised golf for an added attraction—quarry men, tobogganing.

A Chance for Cooperation

Several issues ago we referred editorially to the fight the Associated General Contractors are making against the day-labor system of building public works, and against granting contracts to irresponsible contractors. Under the caption "What is sauce for the goose is sauce for the gander," we endeavored to show that every argument the contractors use to influence their customers or clients could be used with equal force when applied to themselves as purchasers of crushed stone, sand, gravel or slag.

Now, the contractors have come out against various state lien laws, which are designed to protect the material man as well as the laborer. A report of the recent Dallas, Tex., meeting of the executive board, the advisory board and president's council of the Associated General Contractors states:

> The subject of irresponsible bidders naturally prompted discussion of the lien laws and their effect upon the industry—was of fullest interest. It was stated no objection is held to protection of the mechanics, but strong opposition was lodged against the creation of a false system of credit through use of the law as a means of collection for prices of materials left unpaid by irresponsible builders.
>
> With the material men furnishing their products to "fly-by-nighters" from whom they know they will never receive money in payment, and with the surety companies promiscuously bonding the men who secure their materials in this fashion, it is perfectly obvious why so many contractors lacking in "Skill, Integrity and Responsibility" are in the field.

We feel certain that if reputable contractors would cooperate with reputable material producers to eliminate the irresponsible "fly-by-night" material producer, the reputable material producer would be of equal assistance in helping to eliminate the irresponsible "fly-by-night" contractor.

National Gypsum Company Will Make Wall Board Near Buffalo

THE gypsum industry of New York State is in a fair way to a great boom because of the recent discovery of a large deposit near Clarence, N. Y. The extent of the deposit has been estimated at between 5 and 10,000,000 tons, a supply sufficient for 50 years at normal excavation. The discovery is said to have been accidental, although prospecting by several companies has been going on in the vicinity for many months. The geological formation of the country had led geologists to believe that gypsum might be found northeast of the large beds at Akron and Oakfield, but through some freak of nature, the find was actually made in a position northwest of these beds. It is true, continuations of the Akron beds were found in the northeast direction but they had undergone a change into anhydrite, which as yet has found no large important commercial use. The survey has shown that the gypsum strata lies about 50 ft. below the surface and carries an overburden of 20 ft. of soil. Below this is 25 ft. of limestone, the 4-ft. gypsum bed and then another layer of limestone. It is claimed that mining will be made easier because of these limestone layers. The deposit is 4200 ft. wide in comparison with a width of the beds at Akron and Oakfield of 1500 ft. Analysis has shown, it was said, that the gypsum is 4% higher in quality than that at Oakfield and 2% above that produced at Akron.

Although the discovery was made in June, it was kept secret until the formation of the National Gypsum Co. to mine and market it.

The company was organized under the laws of Delaware on August 29, 1925. The authorized capitalization is $2,500,000. Besides its proposed Clarence plant, the company plans to build four other plants in the country, when finances permit.

The officers of the company are all men who have been connected with the industry in all its phases for years.

J. F. Haggerty, president of the company, has a wide experience. For eight years he was in charge of the sales development department of the Sherwin-Williams Co., for 11 years vice-president of the Beaver Board Co. in charge of sale and production of fibre and plaster wallboard and for 2 years secretary of the Universal Gypsum Co. and president and general manager of the Gypsolite Co., the subsidiary of the Universal Co., handling production and sale of plaster wallboard.

C. E. Williams was for 8 years with the United States Gypsum Co., for 5 years vice-president and general manager of the Crown Gypsum Co. of Toronto, Ont., for 5 years general production manager of the American Cement Plaster Co. and for 3 years vice-president in charge of production at the Universal Gypsum Co.

Associated with Mr. Haggerty and Mr. Williams in the enterprise are J. W. Waldron, former chief engineer of the Universal Gypsum Co. and J. J. Turner, former engineer for the Best Wall Manufacturing Co. They will handle the engineering features of the new corporations.

Mr. Haggerty said that the plans for financing the Clarence plant of the company have been practically completed. Outside of the investments of the organizers, the financing is being done in Chicago, which is the center of gypsum securities. The western New York plant of the company at Clarence will entail a cost of about $500,000 and will be completed by next April.

Contracts will be let for the building of a road to the plant, for the laying of railroad tracks from the Batavia-Tonawanda line of the Central and for the sinking of the mine shaft. This will be followed by the awarding of contracts for the plant buildings.

It is not the intention of the company to market crude gypsum. It will manufacture a gypsum plaster wallboard. Sale of gypsum wallboard has increased about 30% a year since 1920, the figure in 1924 being 700,000,000 ft. National Gypsum Co., he said, contemplates a production of 45,000,000 ft. at its Clarence plant.

"The method of manufacturing wallboard has changed radically during the last two years," said Mr. Haggerty. "National will have the latest in design and equipment from the process of combining the raw materials to the loading in cars of the finished product."

The Clarence plant will cover about fourteen acres. Units of the plant will be a mine shaft, block plant, boiler, warehouse and mixing department, calcining department, board warehouse and fan house. It will give employment to from 300 to 500 men.

Mr. Haggerty said that the company has acquired some property by purchase and has leased others. The leased land is expected to yield about 10,000 tons of gypsum to the acre on which the company will pay a royalty of 10 cents per ton.—*Buffalo (N. Y.) Express.*

Clever (?) Detective Work by Grand Rapids Newspaper

THE following story from the *Grand Rapids Herald* is a compilation of rumors resulting from a recent purchase of gypsum lands in Michigan:

Purchase of nearly 1000 acres of Wyoming township by a "mysterious" Edgar R. Hill, for purposes not revealed, is, in probability, for the United States Gypsum Co., it was disclosed yesterday.

A long distance telephone call to the Chicago headquarters of the United States Gypsum Co., for Edgar R. Hill produced the information he was out of the city during the present week and probably in Grand Rapids.

Fred O. Gotch, general manager of the Grand Rapids branch of the gypsum company, denied yesterday any knowledge of purchase of property by the Chicago office, any proposed expansion of the mill, or even knowing the existence of any such man as Edgar R. Hill.

William H. Gilbert, realtor, who acted in that capacity for Mr. Hill, stated his client resides in Evanston, Ill., which is the residence of the officers of the United States Gypsum Co. He asserted, however, he did not know of any connection Hill might have with the gypsum company and stated Hill purchased all the property under his own name. Mr. Gilbert said he did not believe Hill is here at the present time.

Mr. Gotch expressed an opinion he would be acquainted with any action on the part of the company to extend the present holdings.

The purchase price of the various pieces of property was met by check on a Detroit bank, it is said. The land lies in sections 21, 22, 27 and 28, Wyoming township, in the four points at the intersection of the Byron Center road and an east and west town road two miles north of the southern line of Wyoming township. It extends west as far as the Lake Shore and Michigan Southern railroad. The purchase price of one 40-acre farm is said to have been $10,000 in cash.

The purpose for which the purchase is intended is a matter of conjecture. It has not been generally recognized by competing plaster rock companies here that this land has any considerable quantity of the rock.

Three concerns are operating in section 34, Walker township, the center of the plaster rock deposits on the west side of the Grand river where the United States Gypsum Co. holdings are entirely surrounded by the Grand Rapids Plaster Co. and the Beaver Products Co.

The Grand Rapids Plaster Co. operates a quarry in the northwest corner of section 20, Wyoming township, nearly two miles west of the Hill purchase, and the Michigan Gypsum Co. and the Certain-Teed Products Corp. are operating near Beverly in Wyoming township.

For several weeks Hills' purchase of land in Wyoming township has been surrounded by mystery. It has variously been rumored that the properties were being acquired for Henry Ford and for an auto body plant. Those connected with the transactions have given the cryptic explanation that the buyers were going to "start a fruit farm."

Monroe Plant of France Stone Company Destroyed by Fire

THE France Stone Co. of Toledo, Ohio, has plans under way for rebuilding their plant at Monroe, Mich., which was recently destroyed by fire. The plant and power house destroyed were valued at $350,000.

Tomkins Cove Stone Company Lets Contract for Trap-Rock Plant

THE general contract for the construction of the new Haverstraw trap-rock plant of the Tomkins Cove Stone Co. has been let to the Burrell Engineering Co., Chicago.

The plant is to be of a side-hill construction with a capacity of about 2500 cu. yd. daily. The plant is to be divided into two sections, one crushing, the other screening, the two sections being connected by a belt conveyor about 850 ft. long.

A 48x60-in. initial jaw crusher will be followed by gyratory crushers for secondary and reduction crushing. Revolving screens will be used for scalping and coarse sizing, with vibrating screens for the finer sizing. Sizing will be done in progressive stages over silo bin storage, from which the finished stone will be carried by conveyor belt to the loading dock.

Manufacturers' Division of the National Crushed Stone Association Holds Meeting

THE annual pre-convention meeting of the Manufacturers' Division of the National Crushed Stone Association was held at the Commodore hotel, New York City, Friday, October 23. President W. E. Farrell, of the Easton Car and Construction Co., Easton, Penn., presided and 24 member companies were represented by about 35 men. There were present as guests of the Manufacturers' Division, President Otho M. Graves, of the National Crushed Stone Association, and the following officers and directors: E. J. Krause, St. Louis, Mo.; John Rice, Easton, Penn.; W. Scott Eames, New Haven, Conn.; F. W. Schmidt, Morristown, N. J.; W. L. Sporborg, Syracuse, N. Y., and James Savage, Buffalo, N. Y. There were also present as guests the new director of engineering of the National Crushed Stone Association, A. T. Goldbeck, and the new secretary, J. R. Boyd.

The principal business transacted was the election of Gordon Buchanan, president of the C. G. Buchanan Co., New York City, to fill the vacancy in the office of regional vice-president, caused by the death of his father, the late C. G. Buchanan.

It was unanimously voted to sustain the action of the directors of the Manufacturers' Division in contributing $750 from the treasury of the division to the national association toward furnishing the Washington office. It was also unanimously voted that it was the sense of the meeting that the dues of associate members be increased from $50 to $100 a year.

President Graves made an address outlining the plans for the new engineering bureau of the association and frankly outlined the methods adopted for financing this program. He also announced the action of the executive committee in selecting Montreal, Que., January 19, 20, 21 and 22, as the place and time of the next annual convention and exhibition.

President Graves was followed by A. T. Goldbeck, who spoke very frankly of his attitude toward his new work as director of the engineering bureau of the national association. He believes in an unbiased search for truth and in this he is assured of the whole-hearted backing of the directors.

Nathan C. Rockwood, of ROCK PRODUCTS, was delegated to make the preliminary arrangements for the exhibit of the Manufacturers' Division at the Montrela convention and it is expected full details of space available will be ready in about two weeks.

The Vulcan Iron Works, Wilkes-Barre, Penn., and the Canadian Explosives, Ltd., Montreal, Que., were recommended for associate membership.

National Crushed Stone Association Convention

MARK these dates down on your calendar: January 19, 20, 21 and 22. On those days the crushed stone industry will hold the biggest and most important meeting in the history of the quarry industry at the Mount Royal hotel, Montreal, Que.

Every crushed-stone quarry operator in the United States and Canada has a stake in this convention. Therefore don't fail to come personally and take care of your interests personally. Make your reservations now.

There will be the usual exhibit of model machinery and equipment, bigger and more complete in every respect than in former years. The hotel facilities are the best ever.

New Quarry for Consolidated Stone Company

THE Consolidated Stone Co. of Bedford, Ind., has purchased 217 acres of land, 40 of which are stone land, near Clear Creek, Ind. Stripping operations will soon be started and it is expected that some quarrying will be done before the end of the year. A two-mile switch from Clear Creek to the quarry will be laid down and is expected to be ready in time for quarry operations. Core test drills on the property show it to consist of an excellent grade of buff stone.

The company already operates several other quarries and mills in the district and has been producing about 2,000,000 ft. of cut stone per year. The officers of the company are: A. E. Dickinson, president; W. H. Wilson, first vice-president; D. H. Johnson, vice-president, and E. N. Welsh, secretary-treasurer. Offices are maintained in Bedford, Ind.—*Bloomington (Ind.) Telegraph.*

Midwest Division of National Crushed Stone Association Meets at St. Louis

THE MIDWEST Division of the National Crushed Stone Association met recently at the Jefferson hotel, St. Louis, Mo. Seventeen of the 19 Illinois producers were present.

E. J. Krause, member of the executive committee of the national association, reported the details of the recent meeting of the committee in New York and of the Manufacturers' Division dinner held in conjunction with the meeting.

At the St. Louis meeting the new engineering bureau of the association was the subject of discussion. Col. E. J. McMahon, secretary of the St. Louis Quarrymen's Association, and Mr. Eyerman of the Eyerman Construction Co., a director of the quarrymen's association, were present at the discussion by invitation.

At the conclusion of the meeting, Colonel McMahon invited all members to a banquet and entertainment in the evening at the American hotel annex. This banquet was attended by 40 men and Colonel McMahon acted as toastmaster. Among those present were James G. McKelvey, president of the McKelvey Construction Co., who is also president of the St. Louis Quarrymen's Association, and Col. Paul Henderson, an old stone man and at present the president of the National Air Transport, Inc., and who was one of the speakers of the evening. Other speakers were Col. O. P. Chamberlain, vice-president and general manager of the Dolese and Shepard Co., Chicago; Mr. Pitzman of the Pitzman Engineering Co.; F. C. Murphy, secretary of the Brownell Improvement Co., Chicago, and E. J. Krause, president of the Columbia Quarry Co.

The St. Louis meeting was voted a huge success and a number of the St. Louis quarrymen expressed their intention of attending the Montreal convention of the National Crushed Stone Association.

Florida Limestone in 1924

FLORIDA is not usually looked upon as a mining state, yet it has large assets in phosphate and limestone deposits. The limestone production for the year 1924 was 120% larger than in 1923, the figures being $2,717,486 and $1,236,226 respectively. The limestone output includes stone for road material, railroad ballast, concrete, agricultural material, dressed building, riprap, filler and rough stone.

Miscellaneous crushed stone, including principally flint, the state geologist says, also showed a notable increase for 1924 over 1923 in valuation; an 18% advance is indicated, with the valuation of 1924 placed at $225,292, compared with $189,208 in 1923. The increased production of these materials may be accounted for by reason of the real estate boom that has swept over the state.—*Engineering and Mining Journal-Press.*

Trinity Portland Cement Company Formally Opens Fort Worth Plant

THE Fort Worth, Texas, plant of the Trinity Portland Cement Co. was formally opened to the public recently with a barbecue attended by county and city officials, and 600 citizens of Tarrant county and Fort Worth.

The plant, erected at a cost of $1,500,000, is of modern construction, electrically equipped throughout. It has at present one kiln, oil fired, which, however, is 250 ft. long, making it one of the longest used in the industry. Sufficient room has been left in building for future expansion and additions so as to easily double the present capacity of 1700 bbl. per day. Storage capacity at present is 110,000 bbl.

C. E. Ulrickson is general manager of the Trinity Portland Cement Co.; H. B. Gillette, local representative; J. F. Hayden, assistant secretary, and G. G. Tomlinson, traffic manager; A. S. Parsons, sales manager; O. L. Bartholomew, general superintendent of the Dallas and Fort Worth plants, and A. A. Chaney, superintendent of the Fort Worth plant.—*Fort Worth (Texas) Star.*

H. A. Ross New Manager of Louisiana Portland Cement Company

H. A. ROSS, secretary and treasurer of the Indiana Portland Cement Co., Indianapolis, Ind., has been transferred to New Orleans and is now manager of the Louisiana Portland Cement Co., a subsidiary of the International Cement Corp. It is announced that a new plant is to be built in New Orleans for the purpose of manufacturing cement from oyster shells. Mr. Ross will have charge of the construction work. —*Chicago Journal of Commerce.*

MacDonald Engineering Company Expands in Cement Field

THE MacDONALD ENGINEERING CO., of Chicago, Ill., announce the establishment of an eastern division office through a consolidation of interests with the Spencer Construction Co., of Baltimore, Md.

The Spencer Construction Co., of which James Spencer, formerly with the MacDonald Engineering Co., was president, was organized originally in 1913 as the Deverell-Spencer Construction Co. This company existed until 1920, at which time the Spencer interests obtained the control, and from then on the company was known as the Spencer Construction Co. They were designers and builders of cement mills and grain elevators primarily, and of other types of concrete construction.

J. C. Carter, formerly vice-president of the Spencer Construction Co., will be in charge of the eastern division office of the consolidated organization, with headquarters in the Garrett building, Baltimore.

The MacDonald Engineering Co., which was incorporated in 1895, are really pioneer builders of the silo system of cement storage. The first silo for this purpose was designed and constructed in 1909. Up to the present time 6,000,000 bbls. storage capacity have been built and at the present time the company has 1,000,000 bbls. under construction.

Some of the present building projects of the MacDonald Engineering Co. in the cement industry are:

A new plant for the International Cement Co. is being constructed at Norfolk, Va. This plant will have a daily capacity of 3500 bbls. and will be in operation, it is expected, by the first of the year.

The MacDonald company have recently completed storage facilities of 125,000 bbls. for the International Cement Co. at their plant in Buenos Ayres, South America.

They are building a new 2000-bbl. plant for the Calaveras Cement Co. at San Andreas, Calif.

They are designing and building a 275,000-bbl. silo storage system at Alpha Portland Cement Co. plant No. 4, with a packing plant having eight 4-tube Bates packers to provide for a daily packing capacity of 16,000 bbls. on a 10-hr. shift.

They are designing and building a 125,000-bbl. silo storage at Manheim (Alpha plant No. 5), with packing plant having four 4-tube Bates packers and bag storage for 1,000,000 sacks.

The eastern division of the MacDonald Engineering Co. and the Spencer Construction Co. has just closed a contract for the design and construction of a 30,000-bbl. raw silo storage for the Phoenix Portland Cement Co. Nazareth, Penn., plant. The contract also provides for kiln foundation and other concrete work about the plant necessary for its enlargement.

Marquette Cement Company May Build Plant in Iowa

FROM an item in the Marshalltown (Iowa) *Times-Republican,* it would appear that the Marquette Cement Co. of Chicago plans to enter the Iowa field as a cement manufacturer. Previous efforts of the company to acquire the long idle plant of the Gilmore Portland Cement Corp. at Gilmore City, Iowa, failed, but it is expected that soon another bid will be made for the property. (See ROCK PRODUCTS, October 3 issue, for details of Marquette bid for Gilmore plant.)

It is said that the Marquette company has already taken option on limestone acreage at Gilmore City and in the event of being unable to purchase the Gilmore plant will build another with about 3000 bbl. daily capacity. Headquarters and offices of the proposed plant would be maintained at Fort Dodge, Iowa.

Third Unit to Be Added to Clinchfield Plant

WE ARE advised that the contracts for the installation of a third unit at the Clinchfield Portland Cement Co. plant No. 2 located at Clinchfield, Ga., will be let immediately. This plant was recently erected in record time and a complete description reported in ROCK PRODUCTS, September 19 issue.

The additions to be made include a rotary kiln, 175 ft. x 10 ft., and the necessary equipment to provide for the operation. The work of installation, etc., will proceed as rapidly as possible in order to have the new unit in operation by April, 1926. The total production of this plant after additions will be about 1,000,000 bbl. per year.

The entire plant was designed by the operating and construction forces of the Clinchfield Portland Cement Corp. under the direction of Felix Guenther, Jr., general manager, with C. J. Lofstedt as designing engineer. John A. Miller, Nazareth, Penn., is president; James A. Blair, first vice-president; H. R. Dennis, vice-president; W. P. Eaton, secretary; W. M. Bennett, treasurer and assistant secretary; Felix Guenther, Jr., general manager; M. M. Hunter, sales manager; Guy D. Pitts, assistant treasurer and purchasing agent, and E. P. Newhand, chief chemist.

The operating personnel of the new plant consists of C. C. Miller, superintendent; C. J. Lofstedt, operating engineer, and N. V. Geyer, chemist.

Where Cement Is Used

THE belief that the majority of the country's cement output finds its way into concrete pavements and sidewalks is erroneous. Estimates published by the U. S. Geological Survey indicate only 24% of the production of cement—last year 149,000,000 bbl.—is used in paving and highways, and about 7% in sidewalks and private driveways, while another 25% is used in public and commercial buildings, and nearly 21% goes for miscellaneous farm purposes. The remaining portion is employed, in small individual percentages, for miscellaneous purposes.

Hernando Phosphate Mine Furnishes Crushed Rock

MORE than 2% of all the crushed rock produced in America for road and other building purposes comes from a single mine at the edge of Brooksville, Fla., according to J. W. Porter of Porter Brothers, operators of the mine.

The Porter mine is the largest of three mines from which lime and phosphate rock is being taken near Brooksville. A fourth, a $5,000,000 project, is in process of creation and will be ready for operation within a few weeks. Each of these mines employes several hundred men.—*Tampa (Fla.) Tribune.*

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Making Ornaments and Trim-Stone from Sand and Gravel

Art Stone Co. of Sioux City, Iowa, Finds What Is a Side Line with Most Block Makers To Be Its Most Important Product

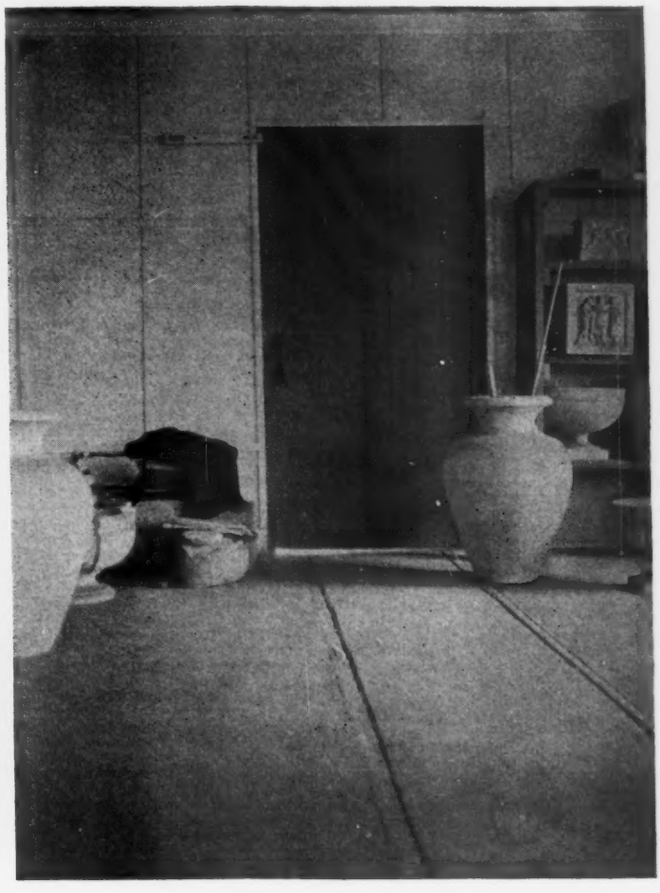
THE cement products business is developing in two lines; one, the strictly utilitarian building unit, the block or the tile, and the other the artistics product which may be trim stone, garden ornaments or the more ambitious sculptural forms.

The Art Stone Co. of Sioux City, Iowa, makes both classes of products. This is not unusual as most block plants have one or more men employed in making trim stone and garden ornaments as a side line. But it is unusual to find the condition reversed so that one man who works at block making and five or six work on trim and ornaments which is what one sees at the Art Stone plant.

A Mooseheart Graduate

Carl Ludwig, the manager, is a graduate of the Mooseheart concrete school which is famed all over the United States for having turned out so many good concrete workers. In addition Mr. Ludwig took a course at the Art Institute in Chicago principally to study the history of ornament and kindred subjects. He has two brothers, E. C. and H. C. Ludwig, who have received a similar training and who are associated with him.

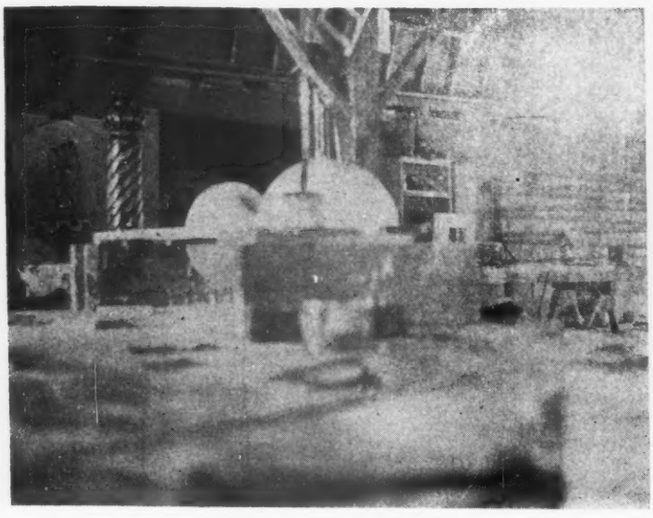
Carl Ludwig, manager of the Art Stone Co., modeling a capital for a column. The modeling is done with sculptors' clay



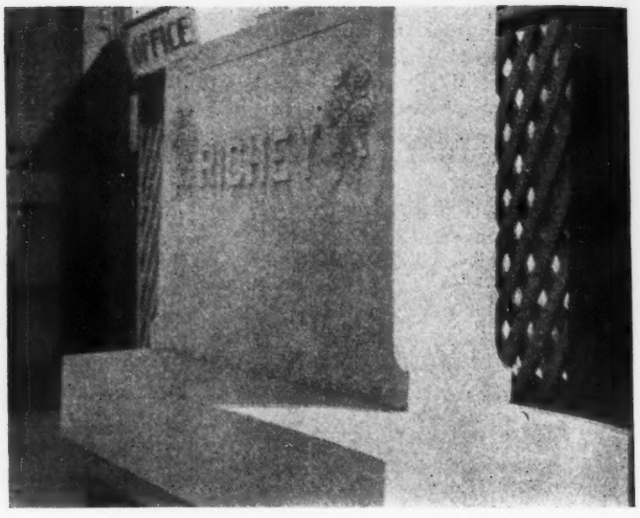
A corner of the sample room of the Art Stone Co., Sioux City, Iowa, showing what can be done with cement and a sand and gravel aggregate

Concrete panels and garden ornaments

Ornamental pieces in sample room



Turning a symmetrical form from plaster by using a template



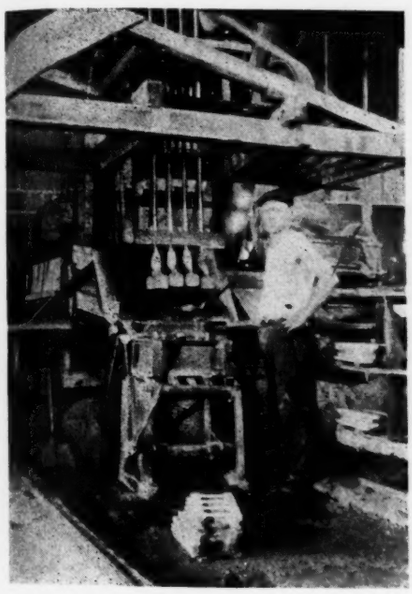
A cemetery monument recently completed

The factory, or studio, of the Art Stone Co. and the company garage

The trim stone on this building was made by the Art Stone Co.

The plant is at 2600 East 3rd street, Sioux City. The building and the garage attached are made of concrete blocks and the yard is filled with ornamental work. It has been in operation since 1922 under the present management.

In the block plant proper there is a standard Anchor block machine, a "Hobbs, Jr." machine made by the Anchor Co., a Besser mixer and a Blystone mixer. The aggregate used is Lyman-Rickey sand-gravel which has a modulus of fineness of 3.50 to 4.00. A 1 to 7 mix is used which gives 18 blocks to the sack of cement and the blocks are of excellent quality. There are no code requirements for blocks in Sioux City so a weaker block might be made, but with the mix described above the blocks have a compressive strength of 1200 to 1250 lb. to the square inch. Perhaps one reason for this is that the mixing is long and very thorough, 4 min. dry mix followed by 4 min. wet, the water being added rather slowly. The consistency is regulated by the "feel" of the mixture. The finished blocks are cured in the usual way.



One of the two cement block machines

In making trim stone and ornamental work care is taken to see that the modulus of fineness is 4.25, a correction being made by adding fine or coarse if this is necessary. Three parts of this are used with one part of Atlas white portland cement and the mixing is very long and very thorough. This is the basis of the work. For facing Barre granite, Crown Point spar and marble is used, but marble is not used for exterior work. Some very beautiful trim stone was shown which was faced with ordinary river sand to which a little black mineral had been added.

The models for this work are made of wood or plaster of paris, or both, the sculptural work being set up in clay. Symmetrical forms are turned in a kind of lathe by the use of a template. These forms are made of plaster of paris and then ornamentation is added in some cases by carving. Glue molds and plaster of paris molds are used for casting, the procedure being that which has been developed for making plaster casts through centuries of experience. It is an art in itself to know how to make models that will go together well and allow each piece to be drawn.

All the finished work is given an acid wash to remove cement and allow only the facing aggregate to show. In this work it is thoroughly brushed.

One of the pictures shows a large apartment house being erected in Sioux City, the trim being all of it from the shops of the Art Stone Co. It has quite as good an effect as though the trim were of cut stone and the cost was less by several thousand dollars.

The Art Stone Co. is incorporated. A. D. Street is president, Dr. H. W. Richey is vice-president, M. J. Henoch is secretary and E. A. Ives is treasurer.

Extensive Improvements for Florida Cement Products Plant

EVERY type of cement products material will be produced at the Haines City Cement Works, Haines City, Fla., after the plans for improvement and expansion are completed. Orders for machinery to manufacture Anchor building tile, a tile machine and power tamper have been placed in addition to an Ideal mixer, electrically operated which has already been shipped to the plant. Arrangements have been made with the Atlantic Coast Line railroad for a receiving track to the plant.

Modern manufacturing methods will prevail. Curing will be in five days by the steam and heat treatment. R. C. Edmiston, owner of the plant, has had a long experience in the manufacture of cement products. —*Jacksonville (Fla.) Journal.*

Farmer Cooperative Limestone Crushing Plants Impracticable

J. R. BENT, director of limestone-phosphate department of the Illinois Agricultural Association, at a meeting of the Morgan County Farm Bureau, Jacksonville, Ill., declared that investigation into many cooperative limestone plants found that the greater majority were failures. Too many factors such as the distance from quarry to consumer, quality of deposit and limited marketing facilities were among the causes listed to make such projects unsuccessful.—*Jacksonville (Ill.) Courier.*

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Columbus, Ohio	.17@.19†	.....	.27@29‡
Detroit, Mich.	16.00*	.....	25.00*
Forest Park, Ill.*	18.00	23.00	30.00
Graettinger, Iowa	.18@.20	.....	.....
Indianapolis, Ind.	.13@.15†	.....	.....
Los Angeles, Calif.	4x3½x12—.03;	6x3½x12—.04½;	8x3½x12—.05½
Oak Park, Ill.	.18@.21a	.23@.26a	.....
Somerset, Pa.	.20@.22	.....	.....
Yakima, Wash.	22.50*	.....	.....

*Price per 100 at plant. † Rock or panel face. (a) Face.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.*	.13½	.20¼	.31½	.47¼	.60¾	1.08	1.62¼	1.95	2.60	2.92½	3.00	3.30	3.75	5.40	6.50	.....	.....
Graettinger, Iowa (drain tile)	.....	.056	.075	.13	.175	.30	.50	.60	.80	1.00	.....	1.60	.....	.....	.....	.....	.....
Grand Rapids, Mich. (b)	.....	.....	.....	.60	.72	1.00	1.28	.....	.....	1.92	2.32	3.00	4.00	.....	.....	.....	.....
Houston, Texas	.....	.19	.24	.43	.55½	.90	.130	.....	†1.70	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	.....
Longview, Wash.					Sewer pipe 40% off list, culvert—list												
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Mt. Pleasant, N. Y.	.....	.17	.26	.39	.50	.68	.93	1.29	.....	1.67	.....	.....	.....	.....	.....	.....	.....
Norfolk, Nebr. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.75	.....	3.25	5.00	.....	.....	.....	.....
Tacoma, Wash.			4 in. to 18 in.		15 to 90 cents per foot												
Wahoo, Nebr. (b)	.....	.....	.....	.....	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Waukesha, Wis.					4-in. to 24-in.—8.00 per ton												
Yakima, Wash.					$10.00 per ton												

*30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced.
† 21-in. diam. ‡ Price per 2 ft. length.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning October 28:

Central Freight Association Docket

11745. Undressed stone, sawed four sides or less. Minimum weight 90% of marked capacity of car or minimum weight 40,000 lb. Bedford-Bloomington, Ind., district to Cedar Rapids, Iowa. Present rate, 26 cents; proposed, 20½ cents, minimum weight 90% of marked capacity of car or 21½ cents, minimum weight 40,000 lb.

11747. Fluxing and dolomite stone. McVittys, Ohio, to Dubois and Punxsutawney, Penn. Present rates, 28 cents; proposed, $2.53 per gross ton.

11753. Stone, natural (other than granite, jasper, marble or onyx), building, dressed, not carved, lettered, polished or traced. Indianapolis, Ind., to Winona, Minn., and St. Paul, Minn. Proposed, $4.67 to Winona, Minn., and $4.87 per net ton to St. Paul, Minn.

11760. Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel. Allegheny (Pittsburgh, North Side), Junction Transfer and Pittsburgh, Penn., to Chicago, Ill. (B. & O. railroad). Present rate, 27½ cents; proposed, $3.28 per short ton.

11768. Sand (except blast core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica). Overpeck, Ohio, to Lorain, Ohio. Present rate, $2.10 per net ton; proposed, $1.50 per net ton.

11788. Gravel and sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica). Mt. Vernon, Ohio, to Apple Creek, Ohio. Present rate, $1.00 per net ton; proposed, 80 cents per short ton.

11787. Gravel and sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica). Earlville Ohio, to Lorain and Avon, Ohio. Present rate, 90 cents per net ton; proposed, 80 cents per ton of 2000 lb.

11794. Crushed stone. McVittys, Ohio, to Mariemont, Sardinia and Hillsboro, Ohio. Present rate, 18, 21 and 18½ cents; proposed, $1.20 to Mariemont and $1.30 per net ton to Sardinia and Hillsboro, Ohio.

11795. To revise present rate on sand (other than blast, engine, foundry, glass, molding or silica) and gravel. West Pittsburgh to Lawrence Junction, Penn., to 70 cents per 2000 lb. Present rate, 90 cents per 2000 lb.

11796. Crushed stone. White Sulphur, Ohio, to Chagrin Falls, Ohio. Present rate, 18½ cents; proposed, $1.00 per net ton.

2843A. Sand, gravel and stone. Carloads, minimum weight marked capacity of car (rates in cents per net ton).

SAND AND GRAVEL

From	Present	Proposed
Kellogg, Ill., to Nason, Ill.	.....	113
Chester, Ill., to Nason, Ill.	.....	113

STONE

From	Present	Proposed
Collins, Ill., to Nason, Ill.	.....	113

568A. Lime, phosphate of. Carloads, from Ohio river crossings to Chicago, Ill., applicable on traffic originating in Southeastern territory. Present, 28 cents; proposed, 22½ cents.

Western Trunk Line Docket

3395D. Lime, common, hydrated, quick or slaked. Carloads, from Mitchell, Ind., to International Falls, Minn. Rates: Present, 30 cents per 100 lb.; proposed, 28½ cents per 100 lb.

4901. Slag, crushed. Carloads, from Wells, Mich., to Chicago, Ill. Present, 13½ cents, crushed stone rates I.C.C. 9500; proposed, $2.43 gross ton.

4920. Stone, crushed, coated with oil, tar or asphaltum. Between Chicago, Milwaukee, Madison, Wis., and St. Paul, Minn., and points in W.T.L. territory. Present, no rates in effect; proposed, to establish a distance scale of rates of which the following is representative:

10 miles and under	96
100 miles and over 75 miles	142
200 miles and over 175 miles	199
300 miles and over 275 miles	257
400 miles and over 375 miles	303

Minimum weight 90% of marked capacity of car except when loaded to full cubical or visible capacity actual weight governs.

4930. Slag or matte, lead, antimony. From Grasselli, Ind., to Midvale, Utah. Present, $1.82 (5th class); proposed, $12.48 per ton. Minimum weight 36,000 lb.

2051P. Stone, crushed. Carloads, from New Ulm, Minn., to Atlantic, Iowa. Present, 14 cents per 100 lb. proposed, 12 cents per 100 lb. Minimum weight 90% marked capacity of car, but not less than 40,000 lb.

Southern Freight Association Docket

23253. Slag. It is proposed to cancel present commodity rate of 40 cents per 100 lb. on slag, water granulated, for cement mills, carloads, minimum weight 40,000 lb., from Ensley, Bessemer, Woodward and East Birmingham, Ala., to North Birmingham, Ala., account of no movement. The general slag, carloads, Birmingham group commodity rate of 2½ cents per 100 lb., to apply after cancellation.

23257. Gravel, etc. It is proposed to realign the rates on gravel, novaculite and ganister, carloads, from Elco and Gravel Pit, Ill., to destination in Mississippi, to be more nearly related to the rates (distance considered) between points in Mississippi and between other Southern points generally. Statement of present and proposed rates will be furnished upon request.

23262. Limestone, ground, powdered or pulverixed. Carloads, minimum weight 60,000 lb.; stone, crushed or rubble, carloads, minimum weight marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Ladds, Ga., to Ebenezer, S. C. Combination now applies. Proposed, $2.48 per net ton, same as present rates from Mascot, Tenn.

23269. Lime. It is proposed that the present commodity description on lime, carloads, from Jacksonville, Fla. (from beyond) to Auburndale, Avon Park, Center Hill, Mabel, Okeechobee, Sebring, West Palm Beach and Winter Haven, Fla., be amended to as to include lime when packed in sacks.

23278. Granite or stone, rough. Carloads, minimum weight 40,000 lb. from Rolesville Quarry, N. C., to Hagerstown, Md. Lowest combination now applies. Proposed, $3.60 per net ton, same as present rate from Columbia, S. C., to Hagerstown, Md.

23297. Sand. Carloads, minimum weight 90% of the marked capacity of car, except that when cars are loaded to their visible capacity actual weight will govern, from Spruce Pine, Ala., to Lawrenceburg, Tenn. Present rate, $1.57 per net ton (combination); proposed, $1.27 per net ton, which is in line with rate from Nashville to Lawrenceburg.

23307. Granite paving blocks. Carloads, minimum weight 25 net tons, from Petersburg, Va., to Philadelphia, Penn. Present rate via A. C. L. railroad, and connecting lines, $6.00 per net ton (class A); proposed, $3.02 per net ton. When from Petersburg Quarry add $1.80 per car to rate shown to cover switching. The proposed rate is the same as now in effect via the S.A.L. railway.

23314. Limestone, ground or crushed. Carloads, minimum weight 90% of marked capacity of car, from Cedar Bluff, Ky., to Clarksville, Tenn. Present rate, 20½ cents per 100 lb.; proposed, $1.17 per net ton, same as rate in effect from Franklin, Tenn.

23318. Bituminous rock. It is proposed to revise the present rates on bitumious rock, carloads, from Bowling Green, Ky., and Epleys, Ky., to stations on the N. & W. railway, so as to avoid Fourth Section violations. Both advances and reductions are involved, and statement of present and proposed rates will be furnished upon request.

23333. Granite or stone, viz.: Paving, curbing, flagging, foundation or building stone, cut to dimensions, but not sawed, sand rubbed, slushed, polished, not carved, or rough unfinished quarried blocks. Carloads, minimum weight 40,000 lb., from Conyers, Lithonia, Redan, Stone Mountain, Granite Hill and Sparta, Ga., to Rocky River, Ohio. Combination rates now apply. Proposed, from Granite Hill and Sparta, $5.04; from other origins named, $4.68 per net ton, same as in effect to Cleveland, Ohio, and Lorain, Ohio.

23334. Slag. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from North Birmingham, Ala., to Banner, Ala. Present rate, 4½ cents per 100 lb. (intrastate only); proposed, 68 cents per net ton (intrastate only), same as in effect from Birmingham to Banner, Ala.

23341. Cement. It is proposed to establish rates on cement, carloads, from Ragland, Ala., to L. & N. railroad stations on Cumberland, Knoxville and Atlanta divisions and branches same as recently authorized for application from Birmingham, Ala.

23344. Stone, crushed. It is proposed to establish rates on crushed stone, carloads, from Newsom, Tenn., to stations on the I. C. railroad, to be the same as from Mimms, Tenn., in lieu of present combination rates, the proposed rates being: To Rives, Moffat, Polk, Obion, Trimble, Templeton and Newborn, Tenn., $1.24 per net ton.

23378. Sand and gravel. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Williams, Ga., to Monticello, Fla. Present rate, $13 per car of 30,000 lb., or $0.866 per ton; proposed rate, 72 cents per ton, based on the single line scale submitted by carriers to Alabama and Georgia Railroad Commissions, reduced 10%.

23383. Bituminous rock asphalt. Carloads, as described in I. C. railroad Tariff I.C.C. 6910, from Summit, Rockport and Big Clifty, Ky., to McMinnville, Tenn. No through rate in effect. Proposed, $3.40 per net ton.

23441. Slag. It is proposed to establish commodity rate on slag, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Birmingham, Ala., and points grouped therewith in Agent Glenn's I.C.C. A371 to N. C. & St. L. railway, Atlanta Division stations, of $1.58 per net ton in lieu of present rates which are based on lowest combinations. Proposed rate made in line with rates to the junction points.

23443. Sand. Carloads, minimum weight 90% of marked capacity of car except when cars are loaded to visible capacity actual weight will govern, from Mendota and Silica, Va., to West Virginia points named below. Present rates, $2.50 per net ton; proposed, to Huntington, $2.20; Charleston, Kanawha, St. Albans, South Ruffner, South Charleston and Elk, W. Va., $2.30 per net ton. Proposed rates are based 20 cents per ton higher than in effect from Kermit, Va.

23499. Lime. Carloads, minimum weight 30,000 lb., from Erin, Tenn., to Brownsville, Tenn. Present rate, $2.60 per net ton; proposed, $2.50 per net ton made on basis of the Fourth Section Committee of Southern Carriers' lime scale.

New England Freight Association Docket

9022. Filter sand and gravel. Minimum weight marked capacity of car, except when loaded to cubical or visible capacity actual weight will apply, from North Wilbraham, Mass., to Hawkesbury, Ont., 24½ cents. Reason: To establish same basis to Hawkesbury, Ont., as applied jointly in New England.

9047. Lime. Minimum weight 40,000 lb., from Highgate Springs, Swanton Fonda Junction and Winooski, Vt., to points on the Long Island railroad., Group A, 23 cents; Group B, 25½ cents; Group C, 26½ cents; Group D, 29½ cents; Group E, 23 cents via C. V. railway., Burling ton-Rut. railroad Chatham, N.Y.C. railroad 60th street and L. I. railroad. Reason: To be on a comparable basis with the rates from Rutland railroad points being 4 cents per 100 lb. over the rates from the Cavendish Center, Rutland, New Haven Junction, Vt., etc.

9053. Sand, building, common or run of bank. Minimum weight 90% of marked capacity of car from Farmington, Conn., to stations on N.Y., N.H. & H. railroad, C.N.E. railway, M.V. railroad, So. Man. railroad, U.E. railways Co., N.Y. Con. railway, U.F. railroad Co. and N.Y. Dock railway, proposed, same scale of rates (based on mileage) as provided from other sand shipping points on the N.Y.,N.H. & H. railroad. Reason: To meet the competitive situation.

Southwestern Freight Bureau Docket

6222. Lime. From Limedale Spur and Ruddells, Ark., to points in Missouri. To establish a rate of 17½ cents per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Limedale Spur and Ruddells, Ark., to points in Missouri on the St. L.-S.F. railway. Shippers state that they are unable to dispose of any lime at points on the St. L.-S.F. railway in Missouri on basis of class rates.

6321. Lime. From Limedale Spur and Ruddells, Ark., to points in Missouri. To establish a rate of 17½ cents per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Limedale Spur and Ruddells, Ark., to points in Missouri on the St. L.-S.W. railway. The proponent advises that he is unable to place any lime at points on the St. L.-S.W. railway on basis of class rates and in view of the fact that rate of 17½ cents is in effect to points in southeast Missouri on the Missouri Pacific as published in Missouri Pacific Tariff 6-25F he desired that the same rate be established to points on the St. L.-S.W. railway.

Rate Structure Investigation

THE Interstate Commerce Commission has issued the following notice in No. 17000, rate structure investigation, and Ex Parte 87, revenues in western district:

Further hearings in these proceedings will be held as follows:

Chicago, Ill.—At the Edgewater Beach hotel, Monday, October 26, at 10 a. m., central standard time, before Chairman Clyde B. Aitchison.

Denver, Colo.—At the Albany hotel, Monday, November 9, at 10 a. m., mountain time, before Examiner W. H. Wagner.

San Francisco, Calif.—At the St. Francis hotel, Monday, November 16, at 10 a. m., Pacific time, before Examiner Wagner.

Minneapolis, Minn.—At the Nicollet hotel, Monday, November 30, at 10 a. m., central standard time, before Examiner J. B. Keeler.

Dallas, Texas—At the Federal building, Monday, December 7, at 10 a. m., central standard time, before Examiner Keeler.

Kansas City, Mo.—At the Chamber of Commerce rooms, Monday, January 4, 1926, at 10 a. m., central standard time, before Commissioner Aitchison.

At the hearings in Chicago, beginning October 26, after L. W. Baldwin, president, Missouri Pacific Railroad Co., has testified, he and such witnesses as testified at the orginal hearings in September at Chicago, and were not cross-examined, will be available for cross-examination. After the conclusion of the cross-examination of such witnesses the testimony of witnesses for other parties will be received at Chicago up to and including November 7. At Denver, San Francisco, Minneapolis and Dallas witnesses will be heard for parties other than the carriers, beginning on the dates above indicated. In response to requests therefor, time will be accorded at Minneapolis for the Northern States Power Co. to present testimony relating to coal rates; at Dallas for the presentation of testimony concerning the suggested establishment of a new rate group embracing certain portions of the Southwest; at Kansas City for the presentation of testimony on the part of the various state commissions, and thereafter testimony relating to lumber, coal, sand, gravel and rock, in the order named. Other parties desiring to introduce testimony at any of the above points will be heard. If the time available at other points is insufficient to receive all the testimony desired to be introduced, opportunity will be afforded to introduce further testimony at Kansas City, where hearings will end.

The commission has authorized the Louisiana Public Service Commission to intervene in Ex Parte 87 with the provision that the permission shall not be construed as allowing intervener to introduce evidence which will unduly broaden the issues raised in the proceeding. A motion of the Louisiana commission to dismiss the application of the carriers in Ex Parte 87 has been denied.—*Traffic World.*

Crushed Stone Rate Probe Asked

ROSCOE BUTNER CO., 702 W. Morris street, Indianapolis, Ind., have filed a petition with the public service commission asking an investigation of freight rates on the Pennsylvania railoard between Greencastle and Lenore, Ind.

The petition charges a rate of $1 was charged for crushed stone while the commission approved a rate of 88 cents a ton. —*Indianapolis (Ind.) Times.*

Lime Complaint Dismissed

AN order of dismissal has been made in No. 15909, Riverton Lime Co. et al. vs. Aberdeen & Rockfish et al., mimeographed, the commission, by division No. 2, finding rates on agricultural lime, from Virginia kilns to destinations in the Carolinas, not unduly prejudicial. The complaint alleged they were unjust, unreasonable, and, as compared with rates from Mascot, Tenn., on ground limestone, to the same or similar destinations, unduly prejudical.

Eleven lime kiln operations, with plants west of the Blue Ridge mountains, made the point that because the carriers serving them were participants in rates on ground limestone from Mascot, Tenn., to the Carolinas that were on a lower level than the rates they maintained on agricultural lime, to the Carolinas, they were guilty of maintaining rates that were unduly prejudicial to the complainants. They asked for reparation and for rates for the future. The prayer for reparation, the report said, was withdrawn at the hearing.

Production of pulverized limestone, at Mascot, the report said, was a by-product incident to the mining and concentration of zinc ores. That ground limestone, it said, came into competition with the lime from the complaining kilns, the limestone moving on materially lower rates than applicable on lime. While the complainants alleged undue prejudice, the report said, they asked to have it removed by having their rates brought down to the limestone level. The commission said one ton of lime, for agricultural purposes, was equivalent to two or two and a half of ground limestone.

The carriers, after conference with the shippers, have determined, the report says, to put into effect a new scheme of rates on burnt lime throughout the South and that under this readjustment, there will be substantial reductions in rates to the Carolinas, if the fourth section relief for which they have applied is granted. However, the commission found the allegations of the complaint had not been sustained. It said that, without making any definite finding as to the propriety of the present relative rates, it was sufficient for the purposes of this case to say that in its opinion any undue prejudice that might have been shown on this record to exist under the present adjustment will be removed as a result of the pending revision of lime rates.—*Traffic World.*

Playing Safe on Southern Freight Rates

AT A RECENT MEETING of the Southern Traffic League the executive secretary was instructed to prepare and transmit to the presidents of all of the class I carriers in the southern region, a letter calling attention to the earnings of southern carriers in the last several years and the pendency of petitions before the state commissions and Interstate Commerce Commission initiated by southern carriers in which the matter of additional earnings are involved. The secretary was instructed to point out to the executives of southern carriers the following facts:

First—That the carriers in this region are now and have been for several years earning a net railway operating income in the aggregate in excess of 5¾%, fixed as a fair rate of return by the commission in "Reduced Rates of 1922" on the basis of the tentative valuation fixed by the commission in Ex Parte 74 before deducting federal income taxes.

Second—That, notwithstanding the splendid financial condition of southern carriers, their traffic officers, through their rate committee, have been for some time and are now engaged in revising generally the entire freight rate structure into, out of, and between, points in the South, in which it is the declared purpose of the carriers simply to eliminate all fourth section departures and place intrastate and interstate rates on the same level, but that, in all such proposed revisions and rerating of the tonnage involved under the proposed rates of the carriers, substantial increases in revenues are invariably shown.

Third—That, since the southern carriers have, for some time and are now, earning a net railway operating income in excess of the fair rate of return fixed by the commission, further increase in such net rail operating income through the process of the general revision now taking place is unwarranted and unjustifiable and results in imposing a burden on southern industry which, in the end, will react unfavorably toward the carriers and create public sentiment that will crystallize in a demand for a general reduction of all rates in this territory.

The secretary was instructed to impress on the executive officers of southern lines the necessity for having the various rate committees of the carriers modify their previously conceived rate scales and adjustments so that the revisions in the future will be downward and not upward; further, that the present and prospective financial condition of the southern carriers imperatively requires that the scales of rates and the proposed revision in its entirety be modified and reduced sufficiently to avoid any further increases in southern carriers' revenues in the aggregate. Modifications in the carriers' proposed adjustment should be such, it is argued, as to reduce the present net railway operating income so as to yield no more in the aggregate than an amount sufficient to produce an annual rate of return of 5¾% on the tentative valuation fixed by the Commission, plus net additions made subsequent thereto before deducting federal income taxes, the commission having said, in "Reduced Rates, 1922," that the fair rate of return therein prescribed of 5¾% should be arrived at before and not after deducting federal income taxes.—*Traffic World.*

Dredge Damaged by Fire

A LARGE dredge used at the Metropolis, Ill., plant of the Western Indiana Gravel Co. met with severe damage through fire recently. The fire started at the top, supposedly from a defective wire, and despite efforts of the crew at work and the local fire department, rapidly worked its way down to the deck.

The dredge, 30x76 ft., was built of Oregon fir and was designed for handling material which consisted for the greater part of hard cemented gravel. The housing for the machinery was completely destroyed. The equipment consisted of a 12-in. American Manganese Co. pump with 250 hp. motor, a Marion hoist with 30 hp. motor and a 65-ft. steel ladder with shaft and cutter. The transformer and motors were completely destroyed. Officials placed the loss at between $20,000 and $25,000, partly covered by insurance.

Work of repairing the machinery and rebuilding the dredge has been started, and it is expected that resumption of business will begin shortly.

Business Outlook by Eastern Authority

TOMKINS BROTHERS, building supply dealers of Newark and Irvington, N. J., Philadelphia, Penn., and Jamaica, N. Y., in their trade review dated October 21, make the following observations:

According to reports from all the usual sources, business conditions are improving all over the country. This is supported by statements from manufacturers, banks, railroad operators, credit reporting agencies, as well as the U. S. Department of Commerce. Conditions are now more nearly normal than at any time in the last decade and there is a greater stability than has prevailed during the post war period. The railroads are carrying more merchandise than ever before in their history and the steel mills are operating at about 80% capacity. This very evident business expansion is all the more reassuring because there is an absence of excessive speculation, (except perhaps on the stock exchange) for the reason that industry has arrived at a more satisfactory balance of price relations than has existed since the war. All signs point toward greater business activity and increasing prosperity throughout the United States this fall and winter.

Portland Cement

In spite of expanded production facilities in the cement industry last year the latest reports indicate that there is less than a week's supply of cement at the mills in the Lehigh Valley district. The peak of cement shipments always comes in late September or early October, and this year, with the heaviest demand known in the industry, some of the mills have been a week or more behind in their shipments. However, some mills catering principally to the dealer trade have purposely avoided heavy contracts, and have therefore been able to keep shipments for dealers' stock right up to date. The present scarcity of cement will quickly be corrected as soon as cold weather stops road work. The mills will then begin to accumulate stock for spring business.

There are rumors of slight reductions in price by some of the western manufacturers, but in the east prices are holding steady.

It is very noticeable that in certain sections where lump lime has been used almost exclusively for finishing up to a very recent period, hydrates are more and more in evidence, due largely to the high cost of slacking and storing lump lime. This, no doubt, partially accounts for the increasing demand for finishing hydrate. Recently large quantities of Ohio hydrates have been shipped to Florida. On days when the embargoes have been lifted for short periods many cars have been hurriedly loaded to get them on the road before the embargo went into effect again. Taking it all together the hydrate industry of Ohio is in excellent shape and several of the manufacturers are increasing the capacity of their plants in order to meet these new conditions.

Options on New York Limestone Deposits Renewed

OPTIONS on limestone deposits in Catskill, N. Y., which are said to be suitable for use in manufacture of cement, have been renewed by several large cement companies. It is said that one of these companies spent over $30,000 last year in making tests and surveys preliminary to erection of a plant. For various reasons, after this survey was made, a long period of inactivities resulted. It is understood that the chief reason was that the company in question considered the price of the lands as exorbitant.

A local man, said to be connected with the activities of the Pennsylvania Cement Co., is reported as stating that that company would soon send a survey outfit to the deposits at Catskill and possibly, if tests and prices were satisfactory, would erect a cement plant within a short time.—*Catskill (N. Y.) Mail.*

Chemical Engineering Catalog for 1925

THE tenth annual edition of the Chemical Engineering Catalog has just been issued. It is essentially a collected, condensed and standardized data catalog for equipment, machinery, heavy and fine chemicals and raw materials used in the industries employing chemical processes of manufacture. It contains a classified index of such material and equipment, carefully cross referenced and a technical and scientific book section, which catalogs and describes briefly an excellent list of books in chemistry and allied industries. The book consists of 1176 pages, 9x11¾ in., bound in limp leather and is published by the Chemical Catalog Co., Inc.

Sand and Gravel Barge Turns Turtle

THE barge, No. 17, owned by the Charles Warner Co. of Wilmington, Del., overturned suddenly while moored to its dock on the Delaware river. The accident is believed to have been caused by the shifting of the cargo of gravel, due to the rocking of the barge on the swells created by the high wind. Although completely overturned, the barge did not sink because of the probable buoyant effect of the air under it. The barge was righted after several hours work with tugs.

Captain Christensen, the only person aboard, was trapped in his cabin by the sudden disaster and was drowned.—*Wilmington (Del.) Bulletin.*

Wallace R. Harris Joins Staff of Eberling Machine Sales Company

WALLACE R. HARRIS has resigned his position with the International Trade Press, Inc., Chicago, as managing editor of *Highway Engineer and Contractor* and of *Concrete Products*, to assume the position of sales manager for the Eberling Machine Sales Co., Cleveland, Ohio, makers of modern equipment for the manufacture of concrete building units. Mr. Harris will maintain an office at 1248 Peoples Gas Building, Chicago.

He was the first president of the Concrete Products Association and retired from this position after 5 years of service. For the past seven years, Mr. Harris has been connected in various capacities with the International Trade Press, Inc., of Chicago. Following a wide experience in engineering work in Canada embracing many fields, particularly concrete and construction work, Mr. Harris became a member of the engineering staff of the Cement Products Bureau of the Portland Cement Association in Chicago, which position he maintained until he joined the International Trade Press.

Mr. Harris is a member of many technical and engineering associations, among them being the Engineering Institute of Canada, American Concrete Institute, Western Society of Engineers, American Road Builders Association, etc. He has also served as a director of two Builders' associations.

Sand and Gravel Rate Boost Suspended at Sandusky

PROPOSED increased rates on car lot shipments of sand and gravel from Sandusky, Ohio, by the Pennsylvania Railroad were suspended by the utilities commission, and a hearing on their reasonableness set for an early date. It was announced at the commission, however, that the P. R. R. may make revisions that will satisfy the commission and eliminate the necessity of a hearing.—*Columbus (Ohio) Journal.*

The Tail of the Comet

LIME MANUFACTURERS may recall the flurry a couple of years ago by some gentlemen who were going to revolutionize the plaster trade with a quick-setting lime plaster. The secret is out now. Here are the patent specifications by Albert A. Alles of Pittsburgh, Penn.:

My invention is found in a hardening composition for lime, and it involves the use of calcium chloride as the hardening agent. My invention consists in so preparing the hardening agent that it may be introduced in the familiar operation of mixing mortar, and, being added will be effective to increase the induration of the mortar when, after being mixed it is spread.

I begin by thoroughly mixing together finely divided coke and finely divided anhydrous calcium chloride. I crush furnace coke and granulate it. Then spread the chloride upon the coke and pound and rub, making intimate mixture. Incident to this step of the operation, a great increase in volume occurs which, provisionally, I impute to the absorption by the chloride of the carbonaceous gases occluded in the coke.

To the relatively bulky mixture so produced I add inert finely divided material, and I have found suitable for this purpose, and available in sufficient quantity and as a refuse material having little or no intrinsic value, the ashes of soft coal. I mix the ashes with the mixture first described, preferably grinding the whole together, and when I have so achieved this second mixing step, I add also finely divided carbon, preferably in the form of charcoal, and continue the mixing operation until I get thorough distribution and intimate mingling of all the ingredients. I give proportions of an actual mixture, prepared in the performance of my invention. I give this statement of proportions by way of example merely. I begin by taking equal volumes of coke dust and of commercial calcium chloride and pound and rub them together. If in the resulting mixture the chloride ingredient shows white, I add a little more coke dust, and continue pounding and rubbing, till the white appearance disappears. To six parts of Mason's hydrate (a commercial lime) I add one part of the compound prepared in the manner described, and to this body of Mason's hydrate and of specially prepared compound I find it advantageous to add small quantities of coal ashes and of powdered charcoal. I find it good to add 5%, by volume, of coal ashes and 0.5% of powdered charcoal. These components are mixed to homogeneity, and finally the mixture is combined with sand, in the ratio of 1:2.5. In preparing for use, water is added in relatively small quantities at first, and the mass is worked slowly.

The material so prepared does not deteriorate, and may be put up in sacks and shipped, as lime is shipped.

When mortar is mixed, of lime and sand, with water, the material I have described may be added, and mixed in, precisely as the lime is added and mixed in. The resultant plaster will be found to harden to a high degree of induration throughout the depth of the layer in which it may be spread.

Experimentation has revealed the fact that the ultimate addition of charcoal to my preparation as described above insures equal induration throughout all the mass of mortar when it sets.

I claim as my invention—

1. A hardening composition for lime, including finely divided coke and calcium chloride intimately mixed together.

2. A hardening composition for lime, including finely divided coke and calcium chloride, intimately mixed together, and distributed through an inert finely divided carrier.

3. A hardening composition for lime, including finely divided coke and calcium chloride, intimately mixed together and distributed through a carrier of coal ashes.

4. A hardening composition for lime, including finely divided coke and calcium chloride, intimately mixed together, and distributed, together with finely divided carbon through the mass of an inert finely divided carrier.

5. The method herein decribed of preparing a hardening composition for lime which consists in grinding together coke and calcium chloride, and distributing the mixture, together with charcoal dust in a mass of coal ashes.

6. The method herein described of preparing a hardening composition for lime which consists in granulating coke, spreading anhydrous calcium chloride upon the mass of granulated coke, pounding and rubbing the material and making intimate mixture of the said components, and distributing the mixture together with finely divided carbon through the mass of inert finely divided material.

Cement Situation in India

ACCORDING to the report of the Madras Department of Industries a large local cement company, which was floated some two years or so ago, under influential auspices, in Bombay, with a capital of Rs. 50 lakhs (approximately $2,500,000) to take over the lease in respect of the mining and quarrying of limestone and shale deposits of Kurnool and to carry on the manufacture of cement at Bezwada was, owing to the depression of trade and the tightness of the money market, unable to obtain the minimum capital prescribed under the Companies Act and so could not proceed to allotment. In the circumstances, they intimated that they were prepared to relinquish the concessions and government thereupon approved the proposal to cancel the mining lease granted to Mr. Ghose in 1920, though if Mr. Ghose or anyone else were successful hereafter in forming a company for the manufacture of cement, government would be prepared to consider sympathetically the question of the grant of a fresh lease. Not much progress appears to have been made by another local concern which was registered in 1920 with a capital of Rs. 25 lakhs (approximately $1,250,000) owing partly to the financial stringency and partly to the difficulty experienced in obtaining a suitable site for the works at Bezwada. It is a matter of great regret (says the report) that the efforts of the department to interest private enterprise in the establishment of a cement industry at Bezwada have been prevented from materializing by the adverse financial conditions, which in the case of the Bezwada Portland Cement Co., Ltd., who were in an advantageous position to develop the industry, has precluded raising capital.—*British Contract Journal.*

American Construction Council to Meet at Chicago

THE fourth annual meeting of the American Construction Council will be held at Chicago, November 13 to 21. It will consist of a series of conferences of importance to the construction industry and American business in general. A feature will be the national conference on better buildings which will last for two days and be attended by representatives of the various branches of the industry from the United States and Canada.

The third day of the council's meeting will begin with a general session on the reduction of construction peaks and depressions. Aside from general discussion there will be a report of the joint committee of the council and the American Railway Association on the co-ordination of publicity for a country-wide campaign on greater stabilization of construction.

There will be a national conference on highway construction.

Group meeting of the constituent elements of the council for discussion of special problems and the election of representatives to the council's board of governors will be held.

In addition to persons within the industry who will discuss the particular topics, speakers of national prominence will address the general sessions of the council's meeting.

High Grade Limestone Discovered Near Perth, Ontario

LIMESTONE said to be nearly 100% pure has been found in Bathurst township, six miles from Perth, Ontario. The outcroppings were for a long time thought to be a part of the granite formation which is characteristic of the geological basis of the section. An examination and subsequent analysis proved it to be calcite. A group of Montreal capitalists have formed a company and bought up the mining rights in the vicinity. It is planned to erect a mill shortly.

Beaver Products Company Plans Extension to Akron Plant

A REPORT from the Akron, N. Y., *Journal* states that Charles Spengler, superintendent of the American Cement Plaster Division of the Beaver Products Co., has announced the completion of plans for additions to their Akron, N. Y., plaster mill. Contract for the new structure will soon be let. The structure will be 125x400 ft. with minor additions, and will be situated west of the present gypsum mills and will have the use of six additional acres of land.

New switch sidings will be built without delay and all other preparatory work undertaken for this new plant which will aid in its rapid completion by March 1.

The new extensions will be built at a cost of about $200,000 and will require 60 additional employes.

New Machinery and Equipment

New Truck and Trailer Crane

A NEW truck and trailer crane is now being placed on the market by the Harnischfeger Corporation (formerly Pawling and Harnischfeger) of Milwaukee, Wis. This crane—known as the P&H Model 203-a truck crane—is said to embody the valuable combination of speed, compactness, lightweight, sturdiness and complete accessibility.

Compactness is achieved mainly by the simple arrangement of having all three drums mounted on one shaft. The hoisting and digging drums are mounted side by side and the boom hoist is placed on the end of this shaft at the left side of the machine. There are only four shafts on the whole machine and only seven main gears and a set of planetary gears. This type of construction gives the very short tail swing of 7 ft. 1½ in. and an overall width of 8 ft. 4 in.

The machine has total weight of 13,000 lb., which includes the entire crane equipment with the structural frame, which fits on the truck, but does not include the weight of the 5½ or 7 ton capacity truck.

Sturdiness on this truck crane is said to be obtained by cast steel revolving frame, cast steel drum bearing frames, heavy swing gear with I-beam spokes and outside teeth. Easier accessibility to parts for adjustments and renewals are claimed by the makers.

This machine is built to handle a ½-yd. clamshell bucket on a 25-ft. boom, or for lifting 10,000 lb. at 10 ft. radius, and is driven by a four-cylinder, 40 hp. motor, which operates at a governed speed of 1000 r.p.m. The motor is placed at the rear of the revolving frame.

The two main drums are mounted side by side on the drum shaft and are controlled by independent clutches and brakes. The drum clutches are controlled by the P&H patented power clutch control, which causes the motor to do the heavy work of operating the clutches.

The boom hoist is located on the main drum shaft and is driven by planetary gears at a line speed of 62½ ft. per min. and can be operated at the same time as, or independently from, the main drums and swinging machinery.

The four main levers are grouped in a unit stand at the right hand in front of the machine.

The revolving frame is a one piece steel casting, heavily ribbed. The swing gear is of large diameter and has outside, noncloggable teeth.

The trailer crane is provided with mechanism to propell itself at a speed of 1¼ miles per hour when on the job.

On both truck and trailer cranes, jacks are provided which screw down against the rear wheels. These relieve the springs of all load when the crane is operating.

This truck and trailer crane may be equipped with clamshell or dragline bucket, crane hook, electric magnet or pile driver and thus may be used for a wide variety of purposes.

Light and sturdy truck and trailer crane which combines speed with power

New Flexible Coupling

A NEW type of shaft coupling has been put on the market by the Farrel Foundry and Machine Co., Buffalo, N. Y. This coupling is designed to take the place of the usual type of flexible coupling. It is called by the makers the Sykes Universal Shaft Coupling, because it is said to be different from other flexible couplings in that it is really a universal joint and is, therefore, capable of not only taking care of small errors in alignment, but will also successfully connect shafts which are grossly misaligned. Its limit of angularity is stated to be 5 deg. It will also connect shafts which are offset as much as 4% of the shaft size. For instance, a coupling made for a 4 in. diameter shaft will allow an offset up to as much as 0.16 in.

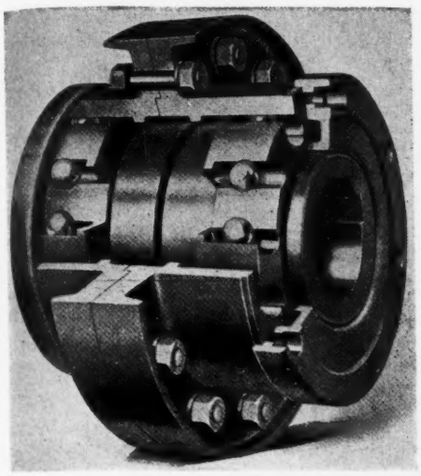
The accompanying illustration shows a coupling with a portion of the outer shell cut away so that its detailed construction is readily understood. It will be seen from the illustration that the coupling consists mainly of three parts. It is, therefore, what is known as a three-element coupling. Two of the elements are in the form of hubs, one adapted to key on the driving shaft and the other on the driven shaft. The third element is made in halves and forms a sleeve, connecting the other two elements. The actual connection, however, is by means of balls bearing in races or grooves formed in lugs. One set of lugs is on each of the hub members and corresponding lugs, inwardly projecting, are on the sleeve members. The sleeve member is made in halves for convenience during installation.

This new coupling is not designed to give torsional resiliency, but by a slight modification can be made to provide resiliency.

All parts of the new coupling are made in steel, of especially hard nature. The ball are standard,

hardened steel balls similar to ball bearings.

It is claimed that with little or no lubrication the coupling will not suffer serious damage. It can be used for connecting electric motors to driven shafts because it permits of axial movement of the armature without any appreciable resistance.



Flexible coupling; shell cut away to show details of construction

The new coupling is at present standardized for shafts from ¾-in. diameter up to 8-in. diameter. Larger sizes will be manufactured later. The 8-in. coupling will transmit 1200 h.p. per 100 r.p.m. The makers issue a list giving all dimensions and power transmitting capacities.

New Electric Stacker

THE Lewis-Shepard Co. of Boston, Mass., have put out a new type of electric stacker which they call the PB. The PB is claimed to be the first stacker to be made on a worm gear drive. The worm runs in oil bath and no gears are exposed. Operation up or down is through a controller. The motor is a high torque, elevator type of 2½ h.p. and operates from a power line. Stacker is equipped with fuse box, safety stops, conductor cables, etc.

The manufacturers say that the type will lift 1000 lb. at a speed of 40 ft. per min. Other points are its ruggedness, especial design to take care of overload and safety type of control.

The Relative Merits of Cotton and Jute Cement Sacks

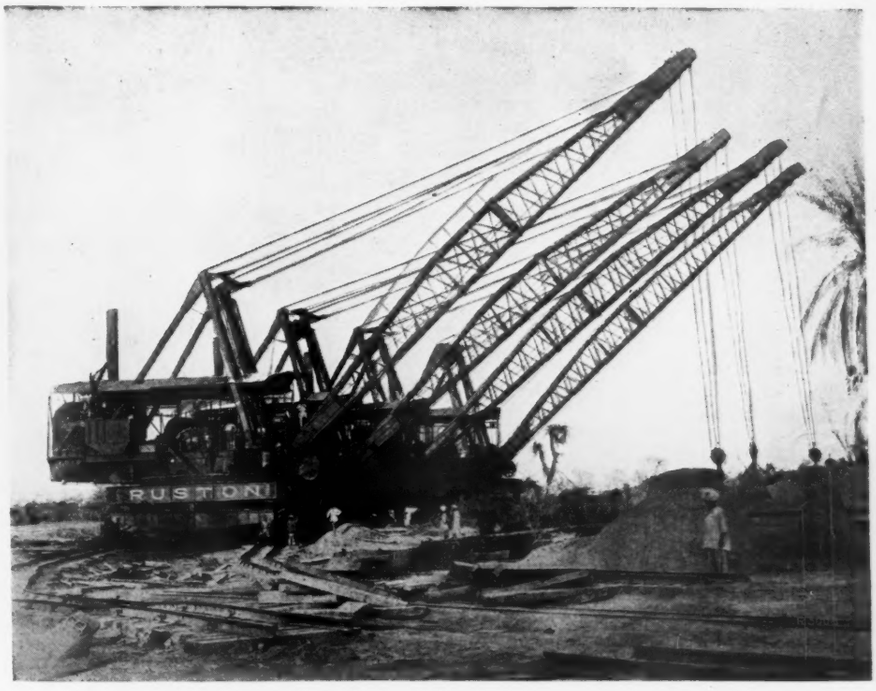
THE large outlay necessary for the cloth containers in which cement is shipped makes any possibility of decreasing the cost or increasing the life of the fabric used of primary importance. The Portland Cement Association established a fellowship at the United States Bureau of Standards to study the relative merits of cotton Osnaburg and several kinds of jute burlap sacks. One type of Osnaburg and four types of jute burlap were studied. The Osnaburg was of unusually high quality for cement sacks. However, Osnaburg of a higher quality, which may be better than the type used here, is now or may eventually be on the market.

Various physical tests have been made, including ones for breaking strength, thread count, length, width, stretch, and, what is of greater importance, the resistance to drop or rough handling. Certain practical tests were also made, such as the service test, where the sacks were put into actual service; the hot cement test, where the sacks were filled with hot, fresh ground cement; the humidity test, where samples were exposed to various atmospheric conditions; and the moisture test, where the sacks of cement were subjected to excessively damp conditions.

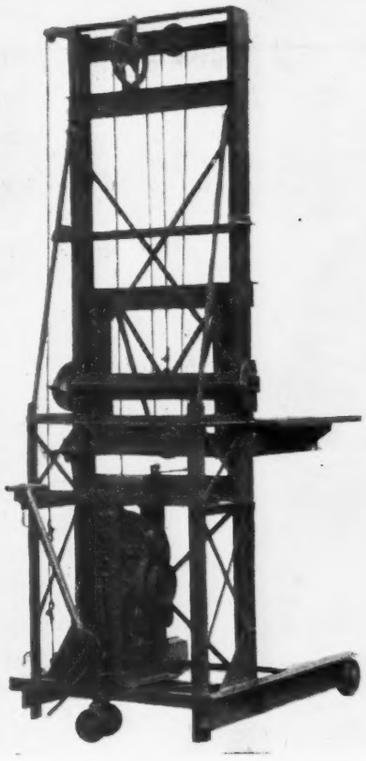
These data were studied, and the sack made of jute material with the following physical properties was found to show the highest degree of serviceability: Threads per inch, warp 18, filling 18½; breaking strength (1 by 1 by 3 in. grab method) warp 153 lb., filling 167 lb.; weight, per sq. yd., 11.8 oz.; per cent of stretch, warp 4 and filling 4. This bag withstood 8 drops from a height of 8 ft. to a smooth cement floor.

Large Draglines for India

WHAT is supposed to be one of the world's largest orders for draglines is being filled by Ruston and Hornsby, Ltd., of London, England. A short time ago the director general of the India Store Dept. placed an order with that company for the four 250-ton dragline excavators pictured and which are now in use on the preparation of 280 ft. waterways in India, which are a part of the Lloyd Barrage and Canal scheme. These are said to have proved so satisfactory that the director general has recently placed an additional order for two more of these dragline excavators, with the company.



Four large dragline excavators at work on a waterway project in India



New electric stacker with worm-gear drive

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	.....	1.75	1.25	1.25	1.25
Cobleskill, N. Y.	1.35	1.25	1.25	1.25	.....	.....
Coldwater, N. Y.	All sizes at 1.40 per net ton					
Eastern Pennsylvania	1.35	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	.....	1.00	1.40	1.30	.....	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Walford, Penn.	1.00	1.30	.....	1.50h	1.50h	.....
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.75	.....	1.75	.....	.....	.....
Bloomville, Middlepoint, Dunkirk Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.10	.....	1.20	1.00	1.05	1.05
Chasco, Ill.	.....	1.15	1.15	1.15	1.15	.....
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.00@1.75	1.20	1.20	1.20	1.20	1.40
	Flux all at 1.30					
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	.90	.90	.90	.90	.90
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Northern New Jersey	1.30	.....	1.80	1.60	1.40	.....
River Rouge, Mich.	1.10	1.10	1.10	1.10	1.10	1.10
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
St. Vincent de Paul, Que.	.85	1.35	1.05	.95	.90	.90
Stone City, Iowa	.75	.....	1.20	1.10	1.05	.....
Toronto, Ont.	.....	1.95	1.80	1.80	1.80	.....
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
Wisconsin Points	.50	.....	1.00@1.15	.90@1.05	.90@1.05	.....
SOUTHERN:						
Alderson, W. Va.	.50	1.60	1.60	1.50	1.40	.....
Allgood, Ala.	Crusher run, fines out, for flux, 1.00 per net ton					
Cartersville, Ga.	1.65	1.65	1.65	1.15	1.15	1.15
Chico, Texas	1.00	1.35	1.35	1.25	1.20	1.10
El Paso, Texas	1.00	1.10	1.10	1.10	.....	.....
Ft. Springs, W. Va.	.50	1.60	1.50	1.35	1.25	.....
Graystone, Ala.	Crusher run fluxing stone, 1.00 per net ton					
Henderson, N. C.	.....	.....	1.50	.....	1.25	.....
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rockwood, Ala.	.90	.....	.....	.....	1.00	.90
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atkinson, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'ngs & Wymore, Neb.	.20	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.80	1.80	1.80	1.80	1.80
Rock Hill, St. Louis Co., Mo.	1.25	1.35	1.35	1.35	1.35	1.25

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.00	1.00	1.00	.90	.90	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Haven, New Britain, Meriden & Wallingford, Conn.	.60	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50e	2.00	1.80	1.40	1.40	.....
Oakland and El Cerritto, Cal.	1.00	1.00	1.00	.90	.90	.....
San Diego, Calif.	.70e	1.80f	1.60	1.40g	1.30	.....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Springfield, N. J.	1.80	2.10	2.10	1.70	1.60	1.60
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga. (granite)	1.35	2.35	2.35	2.00	2.00	2.00
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	.....	1.40	.....
Coldwater, N. Y.—Dolomite	1.50 all sizes					
Columbia, S. C.—Granite	.50	1.75	1.75	.....	1.60	.....
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.	.75	1.75	1.60	1.25	1.25	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	1.50	2.00	1.80	1.40	1.40	.....
Richmond, Calif.—Quartzite	.75*	.....	1.50*	1.50*	1.50*	.....

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	4.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Belfast and Rockland, Me. (rail), Lincolnville, Me. (water), analysis $CaCO_3$ 90.04%; $MgCO_3$ 1.5%, 100% thru 14 mesh, bags	4.50
Bulk	3.00
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 50% thru 50 mesh	1.50
Cartersville, Ga.—Analysis 68% $CaCO_3$, 32% $MgCO_3$; pulverized	2.50
50% thru 50 mesh	2.00
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk	3.00
Henderson, N. C. (paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Analysis $CaCO_3$, 56%; $MgCO_3$, 42%; 65% thru 200 mesh, bags	3.95
Bulk	2.70
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Janesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk	3.60
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@ 4.50
Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 100% thru 20 mesh—burlap bags	5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis 99.5% $CaCO_3$, 0.25% $MgCO_3$; 50% thru 200 mesh; bags, 3.25@3.50; bulk	2.00@ 2.25
Waukesha, Wis.—90% thru 100 mesh	4.50
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Rutland, Vt.—90% thru 100 mesh; 7.00 in bags; bulk	4.50

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 50 mesh, 6.00; 50% thru 4 mesh	4.00
Alderson, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh	1.50
Atlas, Ky.—Analysis over 90% $CaCO_3$; 90% thru 4 mesh	1.00@ 2.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 90% thru 4 mesh	.60@ 1.00

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh 1.75
50% thru 4 mesh 1.50
Chasco, Ill.—50% thru 100 mesh 1.20
Chico, Texas—90% thru 4 mesh; bulk .. 1.50
Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh 1.35
Cypress, Ill.—90% thru 100 mesh 1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh 1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh 1.50
Garnet, Okla.—All sizes 1.25
Gary, Ill.—Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .75
Kansas City, Mo.—50% thru 100 mesh 1.00
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh 2.00
Screenings (¼ in. to dust) 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk 1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh .... 1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh 1.60
Milltown, Ind. — Analysis $CaCO_3$, 93.10%, 40% thru 50 mesh ..... 1.35@ 1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh 1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh 1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes 1.25
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk 2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk 3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk .... 3.00@ 3.50
Rocky Point, Va.—80% thru 200 mesh; bags ..... 4.25@ 4.75
Waukesha, Wis.—90% thru 100 mesh, bulk 3.70

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Glass Sand:
Berkeley Springs, W. Va.—Glass sand .. 2.25
Cedarville and S. Vineland, N. J.—
Damp 1.75
Dry 2.25
Cheshire, Mass.:
6.00 to 7.00 per ton; bbl 2.50
Columbus, Ohio ..... 1.25@ 1.50
Estill Springs and Sewanee, Tenn 1.50
Franklin, Penn. 2.00
Gray Summit and Klondike, Mo 2.00
Los Angeles, Calif.—Washed 5.00
Mapleton Depot, Penn ..... 2.00@ 2.25
Massillon, Ohio 3.00
Mineral Ridge and Ohlton, Ohio 2.50
Oceanside, Calif. 3.00
Ottawa, Ill.—Chemical and mesh guaranteed 1.25
Pittsburgh, Penn.—Dry 4.00
Damp 3.00
Red Wing, Minn.:
Bank run 1.50
Ridgway, Penn. 2.00
Rockwood, Mich. ..... 2.75@ 3.25
Round Top, Md. 2.25
San Francisco, Calif. ..... 4.00@ 5.00
St. Louis, Mo. 2.00
Sewanee, Tenn. 1.50
Thayers, Penn. 2.50
Utica, Ill. ..... 1.00@ 1.15
Zanesville, Ohio 2.50
Miscellaneous Sands:
Aetna, Ind.:
Core, Box cars, net, .35; open-top cars ..... .30
Albany, N. Y.:
Molding coarse 2.00
Molding fine, brass molding 2.25
Sand blast 4.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. S'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95	.....	.....	.85	.....
Erie, Pa.	.....	1.00*	.....	1.50*	1.75*	.....
Farmingdale, N. J.	.....	.48	1.05	1.20	1.10	.....
Hartford, Conn.	.65*	.....	.....	.....	.....	.....
Machias Jct., N. Y.	.....	.75	.75	.75	.75	.75
Montoursville, Pa.	1.00	1.10	1.00	.75	.75	.75
Northern New Jersey	.50	.50	1.25	1.25	1.25	.....
Olean, N. Y.	.....	.75	.75	.75	.75	.75
Shining Point, Penn.	.....	.....	1.00	1.00	1.00	1.00
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Ind.	.75	.75	.75	.75	.75	.75
Barton, Wis.	.....	.50	.75	.75	.75	.75
Boston, Mass.‡	1.60	1.60	2.25	2.00	.....	2.00
Chicago, Ill.	1.20	1.10	1.10	.....	.....	1.00
Columbus, Ohio	.....	.70	.50	.70	.70	.....
Des Moines, Iowa	.40	.40	1.20	1.50	1.50	1.50
Eau Claire, Wis.	.40	.40	.80	.95	.....	.85
Elkhart Lake, Wis.	.60	.40	.40	.50	.50	.50
Ferrysburg, Mich.	.....	.50@ .80	.60@1.00	.60@1.00	.....	.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Haven, Mich.	.....	.40@ .80	.....	.60@1.00	.....	.....
Grand Rapids, Mich.	.50	.50	.....	.80	.70	.70
Hamilton, Ohio	.....	1.00	.....	.....	1.00	.....
Hersey, Mich.	.....	.50	.....	.....	.....	.70
Humboldt, Iowa	.....	.85	2.00	2.00	2.00	.....
Indianapolis, Ind.	.60	.60	.....	.90	.75@1.00	.75@1.00
Janesville, Wis.	.....	.65@ .75	.....	.....	.65@ .75	.....
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn., and Appleton	.60e	.40	.....	.....	1.25	1.25
Mattoon, Ill.	.75	.75	.75	.75	.75	.75
Milwaukee, Wis.	.....	1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.50	.50	1.25	1.25	1.25	.....
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.65	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.60	.75	.85	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	.....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.	.....	.40@ .70	.30@ .50	.50@ .60	.60	.60
Zanesville, Ohio	.....	.60	.50	.....	.80	.....
SOUTHERN:						
Charleston, W. Va.		All sand, 1.40.		All gravel, 1.50.		
Chattanooga, Tenn.	.....	1.40	1.35	1.20	1.20	1.20
Chehaw, Ala.	00@ .30	.....	.40	.50	.....	.....
Knoxville, Tenn.	.75@1.00	.75@1.00	1.20	1.20	1.20	1.00
Lindsay, Texas	.....	.....	.....	.....	.55	.....
Macon, Ga.	.....	.50	.....	.....	.75	.....
New Martinsville, W. Va.	1.00	.90@1.00	.....	1.30	.....	.80@ .90
Roseland, La.	.50	.50	2.00	.....	1.00	.....
Smithville, Texas	.....	.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	.....
Kansas City, Mo.	.80	.70	.....	.....	.....	.....
Los Angeles, Calif. (d)	.50	.40	.40	.75	.75	.75
Los Angeles district (bunkers)†	1.50	1.40	1.85	1.85	1.85	1.85
Phoenix, Ariz.	1.25*	1.00*	2.50*	2.00*@2.25*	1.75*	1.50*
Pueblo, Colo.	1.10*	.90*	.....	1.60*	.....	1.50*
San Diego, Calif.	.....	.60	1.25	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80	.....	.55@ .75	.....	.....	1.00
Chehaw, Ala.	00@ .30	.....	.....	.....	.....	.....
Chicago, Ill.	.95	.....	.....	.....	.....	.....
Des Moines, Iowa	.50	.....	.....	.....	.....	.....
Dudley, Ky. (crushed silica)	1.10	1.10	.....	.90	.....	.....
East Hartford, Conn.			Sand, .65			
Elkhart Lake, Wis.	.50	.....	.....	.....	.....	.....
Ferrysburg, Mich.	.....	.....	.....	.....	.....	.65@1.00
Gainesville, Texas	.....	.95	.....	.....	.....	.55
Grand Haven, Mich.	.....	.....	.....	.....	.....	.80@1.00
Grand Rapids, Mich.	.....	.....	.....	.60	.....	.....
Hamilton, Ohio	.....	.....	.....	.....	.70	.....
Hersey, Mich.	.....	.....	.....	.50	.....	.....
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Lindsay, Texas	.....	.....	.....	.....	.....	.55
Macon, Ga.	.....	.35	.....	.....	.....	.....
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.	.....	.....	.....	.....	.....	.60
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.10	1.00	.....	.....	.....	.....
Zanesville, Ohio	.....	.....	.....	.....	.....	.....

(a) ¾ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job.
(d) Less 10c per ton if paid E.O.M. 10 days. (e) pit run.

Miscellaneous Sands

(Continued from preceding page)

Arenzville, Ill.:		
Core		.75
Molding fine	1.50@	1.75
Beach City, Ohio:		
Core		1.75
Stone, sawing, coarse		1.75
Molding, fine and coarse, washed	1.75@	2.25
Traction	1.50@	2.00
Furnace lining	2.00@	2.50
Cheshire, Mass.:		
Glass sand, 24 and 40 mesh, bulk		5.00
Columbus, Ohio:		
Core	.20@	1.50
Traction	.20@	1.25
Stone sawing		1.50
Brass molding	2.00@	2.50
Molding fine	1.50@	2.50
Furnace lining	2.00@	2.50
Molding coarse	1.50@	2.00
Sand blast	3.50@	4.00
Eau Claire, Wis.:		
Sand blast	3.00@	3.25
Core		1.00
Roofing sand		4.25
Elco, Ill.:		
Ground silica per ton in carloads	18.00@	31.00
Elnora, N. Y.:		
Brass molding		1.75
Estill Springs and Sewanee, Tenn.:		
Molding fine and core		1.25
Roofing sand, sand blast, traction	1.35@	1.50
Franklin, Penn.:		
Core		2.00
Molding, fine and coarse		1.75
Gray Summit and Klondike, Mo.:		
Core, roofing and brass molding		2.00
Molding fine and coarse, traction		1.75
Furnace lining		1.00
Stone sawing	.85@	1.00
Joliet, Ill.:		
No. 2 molding sand; also loam for luting purposes and open-hearth work	.65@	.85
Kasota, Minn.:		
Stone sawing		1.00
Mapleton Depot, Penn.:		
Glass sand	2.00@	2.25
Molding fine, traction and sand blast		2.00
Massillon, Ohio:		
*Glass sand		3.00
Core, furnace lining, molding fine and coarse		2.50
Traction		2.00
Michigan City, Ind.:		
Core and Traction	.15@	.30
Mineral Ridge and Ohlton, Ohio:		
Furnace lining, molding coarse, sand blast, traction (damp)		1.75
Roofing sand (damp)	1.75@	2.00
Core, molding fine (damp)		2.00
Glass sand (dry)		2.50
Montoursville, Penn.:		
Traction		1.10
Core	1.25@	1.50
New Lexington, Ohio:		
Molding fine		2.00
Molding coarse		1.50
Oceanside, Calif.:		
Roofing sand		3.50
Ottawa, Ill.:		
Molding coarse (crude silica, not washed or dried)	.75@	1.00
Red Wing, Minn.:		
Core, furnace lining, stone sawing		1.50
Molding fine and coarse, traction		1.25
Sand blast		3.50
Filter sand		3.75
Ridgeway, Pa.:		
Glass sand	2.15@	2.50
Molding fine		1.50
Core		1.75
Molding coarse	1.25@	1.50
Round Top, Md.:		
Core		1.60
Glass sand		2.00
Sand blast		2.25
Roofing sand		2.25
St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50

Miscellaneous Sands

(Continued)

Molding coarse	1.25@	1.75
Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif.:		
(Washed and dried)—Core, sand blast and brass molding	3.50@	5.00
Furnace lining and roofing sand	3.50@	4.50
Molding fine and traction		3.50
Molding coarse		4.50
(Direct from pit)—Core and molding fine	2.50@	4.50
Sewanee, Tenn.:		
Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding		1.25
Skerkston, Ont.:		
Traction (lake sand)		.65
Tamalco, Ill.:		
Molding coarse	1.25@	1.50
Tamms, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Thayers, Penn.:		
Core		2.00
Molding fine and coarse		1.25
Traction		2.25
Utica, Ill.:		
Glass sand and brass molding		.75
Molding fine		.60
Core and molding coarse	.55@	1.25
Furnace lining	.60@	1.25
Traction		1.00
Roofing and stone sawing	1.00@	2.50
Sand blast		2.50
Utica, Penn.:		
Core		2.00
Molding fine and coarse		1.75
Warwick, Ohio:		
Core, molding fine and coarse (green)		1.75
Core, molding fine (dry)		2.25
Zanesville, Ohio:		
Molding fine	1.75@	2.00
Molding coarse	1.50@	1.75
Brass molding		1.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium nd Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00	.....	1.25	.....	.....	.....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.35	1.65	1.45	1.35	1.45	1.45
Jackson, Ohio	.....	1.05	.....	1.30	1.05	1.30	1.30
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	.....	1.45	.....	1.55	1.45	1.55	1.55
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	12.00	.....	.....	.....	.....	2.20
Buffalo, N. Y.	.....	10.00	.....	12.00	.....	.....	.....	.....
Lime Bridge, Penn.	.....	.....	.....	.....	.....	.....	5.00a	.....
West Stockbridge, Mass. (f)	13.00	10@11.00	5.00	.....	.....	.....	.....	2.25t
Williamsport, Penn.	.....	.....	10.00	.....	.....	.....	6.00	.....
York, Penn.	.....	10.50	10.50	11.50	.....	.....	8.50	1.65i
CENTRAL:								
Cold Springs, Ohio (f)	12.50	10.00	9.00	.....	9.00	11.00	9.00	.....
Delaware, Ohio	12.50	10.00	9.00	10.00	.....	.....	9.00	1.50
Gibsonburg, Ohio (f)	12.50	10.00	9.00	.....	9.00	11.00	9.00	.....
Luckey, Ohio (f)	12.50	.....	.....	.....	.....	.....	.....	.....
Huntington, Ind.	12.50	10.00	9.00	.....	.....	.....	.....	.....
Luckey, Ohio (f)	12.50	.....	.....	.....	.....	.....	.....	.....
Marblehead, Ohio	.....	10.00	9.00	.....	.....	.....	9.00	1.50c
Marion, Ohio	.....	10.00	9.00	.....	.....	.....	9.00	1.50c
Sheboygan, Wis.	.....	.....	.....	.....	.....	.....	9.50	.....
Tiffin, Ohio	.....	.....	.....	.....	9.00	.....	.....	.....
White Rock, Ohio	12.50	.....	.....	.....	9.00	11.00	.....	.....
Woodville, Ohio (f)	12.50†	10.00†	9.00†	12.50†	9.00	10.00	8.50	1.50
SOUTHERN:								
Allgood and Saginaw, Ala.	12.50	10.00	.....	10.00	.....	1.35u	8.50	1.50
El Paso, Texas	.....	.....	.....	.....	.....	.....	10.00	1.75
Graystone, Landmark and Wilmay, Ala.	12.50	10.00	.....	850.@10.00	.....	1.35u	8.50	1.50
Karo, Va.	.....	10.00	9.00	.....	.....	.....	7.00g	1.65h
Knoxville, Tenn.	20.50	11.00	.....	.....	.....	1.35	8.00	1.50
Ocala and Zubz, Fla.	12.50	12.00	10.00	.....	.....	.....	12.00	1.70
Varnons, Ala. (f)	.....	10.00p	10.00p	.....	.....	.....	8.00q	1.40r
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
San Francisco, Calif.	21.00	21.00	15.00	21.00	.....	.....	14.50	1.90v
Tehachapi, Calif.	.....	.....	8.00	.....	.....	.....	13.00z	2.20x

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180-lb. net barrel 1.65; 280-lb. net barrel, 2.65 (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) common, 2.50 plastering; 3.00 finishing; (u) two 90-lb. bags; (v) wood burnt; (x) wood, steel $2.30; (z) to $15.00.

*Quoted f.o.b. New York.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel worker's crayons, per gross		.08 1.25
Chatsworth, Ga.:		
Crude talc		5.00
Ground (150-200 mesh), bags		10.00
Pencils and steel workers' crayons, per gross	1.10@	1.50
Chester, Vt.:		
Ground (150-200 mesh), bulk	8.00@	9.00
Including bags	10.00@	11.00
Chicago and Joliet, Ill.:		
Ground (150-200 mesh), bags		30.00
Dalton, Ga.:		
Crude talc		5.00
Ground talc (150-200) bags		10.00
Pencils and steel workers' crayons, per gross	1.00@	2.50
Emeryville, N. Y.:		
(Double air floated) including bags;		
325 mesh		14.75
200 mesh		13.75
Hailesboro, N. Y.:		
Ground white talc (double and triple air floated) including bags, 350 mesh	15.50@	20.00
Henry, Va.:		
Crude (mine run)	3.50@	4.00
Ground talc (150-200 mesh), bags	9.75@	15.00
Joliet, Ill.:		
Ground talc (150-200) bags		30.00
Keeler, Calif.:		
Ground (200-300 mesh), bags	20.00@	30.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), bags		13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-72%	4.50@	5.00
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@	8.00

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%		7.00
Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@	5.00
Mt. Pleasant, Tenn.—B.P.L. 65%; bulk, 7.00; bags		9.00
Twomey, Tenn.—B.P.L. 65%	7.00@	8.00

(Continued on next page)

Cement Tile (Cement Block and Pipe Prices on Page 77)

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

	Hawthorne tile, per sq.
Cicero, Ill.	
Red Spanish	10.00
Green Spanish	12.00
Red French	9.50
Green French	11.50

	—Cicero— Red	Green
Ridges	.25	.35
Hips	.20	.30
Ridge closers	.05	.06
Hip terminals, 3 way	1.25	1.50
Hip starters	.50	.60
Gable finials	1.25	1.50
Gable starters	.20	.30
End bands	.20	.30
Eave closers	.06	.08

Cement City, Mich. — 5"x8"x12", per M	55.00
Detroit, Mich.—5x8x12, per C	8.00
Grand Rapids, Mich.:	Per 1000
5x4x12	45.00
5x8x12	70.00
5x8x 6	35.00
Houston, Texas.—Roofing Tile, per sq.	
Red	17.00
Green	19.50
	Per 1000
5x4x12 (Lightweight)	45.00
5x8x12 (Lightweight)	80.00
Indianapolis, Ind.—9"x15"	
Gray	10.00
Red	11.00
Green	13.00
Longview, Wash.—(Stone Tile)	Per 1000
4x6x12	60.00
4x8x12	65.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Pasadena, Calif.:	Per 1000
4x4x12	$30.00
4x6x12	50.00
4x8x12	60.00
Wildasin Spur, Los Angeles, Calif:	
4x3½x12	.03½
6x3½12	.04½
8x3½x12	.05½
Yakima, Wash.:	
5x8x12	.10

(Continued from preceding page)

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.50
70% min, B.P.L., Basis 70%	2.75
72% min. B.P.L., Basis 72%	3.00
75/74% B.P.L., Basis 75%	4.00

Fluorspar

Fluorspar, 85% and over calcium fluoride, not over 5% silica, per net ton, f.o.b. Illinois and Kentucky mines	16.00
No. 2 lump, per net ton	19.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per net ton	16.00
Fluorspar, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, per net ton, f.o.b. Illinois and Kentucky mines	32.50

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars		10.50
Brandon, Vt.—English pink and English cream	*11.00	*11.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		10.00
Easton, Pa., and Phillipsburg, N. J.—Green granite	16.00@20.00	16.00@20.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio		6.00@18.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Calif. — "Natrock" roofing grits		14.00
Tuckahoe, N. Y.		12.00
Villa Grove, Colo.		13.00
Wauwatosa, Wis.		16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C.L., 15.50.
*C.L. including bags; L.C.L. 14.50.
‡C.L. including bags; L.C.L. 10.00.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Ensley, Ala. ("Slagtex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@50.00
Milwaukee, Wis.	15.00@16.00	30.00@42.00
Mt. Pleasant, N. Y.		14.00@23.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	12.50	
Philadelphia, Penn.	†15.25	21.50
Portland, Ore.	15.00@17.00	23.00@150.00
Prairie due Chien, Wis.	14.00	25.00@32.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	21.00	35.00
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	

†Gray. ‡Red.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass	14.50
Brighton, N. Y.	*19.75
Dayton, Ohio	12.50@13.50
Detroit, Mich.	*17.50
Farmington, Conn.	14.00
Flint, Mich.	16.00@19.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	12.00
Milwaukee, Wis.	*13.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Sebewaing, Mich.	11.00
Syracuse, N. Y.	17.00
Terra Cotta, D. C.	13.50
Wilkinson, Fla.-White Buff	12.00 16.00

*Delivered on job.

Gray Klinker Brick

El Paso, Texas	13.00

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.		3.47
Atlanta, Ga.		2.75•
Baltimore, Md.		2.90•
Birmingham, Ala.		2.50•
Boston, Mass.		2.53
Buffalo, N. Y.		2.28
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa		2.34
Charleston, S. C.		2.85
Cheyenne, Wyo.	.86½	3.46
Cincinnati, Ohio		2.37
Cleveland, Ohio		2.29
Chicago, Ill.		2.10
Columbus, Ohio		2.44
Dallas, Texas	.48¾	2.15
Davenport, Iowa		2.29
Dayton, Ohio		2.48
Denver, Colo.	.66¼	2.65
Detroit, Mich.		2.25
Duluth, Minn.		2.09
Houston, Texas		2.60
Indianapolis, Ind.		2.29
Jackson, Miss.		3.00•
Jacksonville, Fla.		2.85
Jersey City, N. J.		2.33
Kansas City, Mo.		2.02
Los Angeles, Calif.	.63	2.52
Louisville, Ky.		2.27
Memphis, Tenn.	.65	2.60
Milwaukee, Wis.		2.25
Minneapolis, Minn.		2.32
Montreal, Que.		1.90
New Orleans, La.		2.80•
New York, N. Y.		2.15
Norfolk, Va.		2.35
Oklahoma City, Okla.		2.56
Omaha, Neb.		2.51
Peoria, Ill.		2.27
Philadelphia, Pa.		2.31
Phoenix, Ariz.		3.70
Pittsburgh, Penn.		2.09
Portland, Ore.		2.60
Reno, Nevada	.75¼	3.01
Richmond, Va.		2.47
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.		2.31
Savannah, Ga.		2.85
St. Louis, Mo.	.57½	2.30
St. Paul, Minn.		2.32
Seattle, Wash. (10c discount)		2.65
Tampa, Fla.		3.05
Toledo, Ohio		2.40
Topeka, Kans.		2.40
Tulsa, Okla.		2.43
Wheeling, W. Va.		2.27
Winston-Salem, N. C.		3.19•

NOTE—Add 40c per bbl. for bags.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.		1.95
Chattanooga, Tenn.		2.45•
Concrete, Wash.		2.35
Davenport, Calif.		2.05
Detroit, Mich.		2.15
Hannibal, Mo.		2.05
Hudson, N. Y.		2.05
Leeds, Ala.		
Mildred, Kans.		2.35
Nazareth, Penn.		1.95
Northampton, Penn.		1.95
Steelton, Minn.		2.00
Toledo, Ohio		2.20
Universal, Penn.		1.95

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	2.00@2.50	15.00f	15.00h	8.00	10.00	9.50	11.00	.....	25.80	11.00	.....	.....	.....
Douglas, Ariz.	.....	.....	7.00	.....	.....	15.50d	18.50	.....	30.00	15.50	.....	.....	.....
Grand Rapids, Mich.	1.50@1.75	.....	6.00	9.00@11.00	8.00@10.00	8.00@10.00	.....	.....	30.00	.....	.....	.....	30.00
Gypsum, Ohio‡	3.00	4.00	6.00	8.00	9.00	9.00	18.00	7.00	27.00	18.00	.....	20.00	30.00
Hanover, Mon'	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles, Calif.	.....	.....	8.00b	10.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	.....	16.40	.....	17.40	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	18.00a	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00; (b) net; (c) gross. (d) hair fibre; (f) delivered; (h) delivered in 6 states; (i) delivered on job.

Gold Dust from Our Waste Flume

Irrelevant and Amusing Stuff That Passes Our Editorial Desks

The Deluge

INTRODUCING this semi-occasional department of ROCK PRODUCTS in our September 5 issue we referred to the flow of material over our editorial desks. Witness the accompanying view as proof.

The editorial spillway

We would like to suggest here that this department of our paper is open for original contributions—if there is any such thing, bearing in mind Mark Twain's seven fundamental jokes.—The Editors.

What Say Now?

"Getting out a newspaper or a publication is no picnic. If we print jokes, folks say we are silly—if we don't, they say we are too serious. If we publish original matter they say we lack variety—if we publish things from other papers they say we are too lazy to write. If we don't go to church we are heathens—if we go we are hypocrites. If we stay in the office we ought to be out rustling for news—if we rustle for news we are not attending to business at the office. If we wear old clothes we are slovens—if we wear new clothes they are not paid for. What in thunderation is a poor editor to do anyhow? Like as not someone will say we swiped this from an exchange. So we did!" —*Steam Power.*

Business man (to applicant): I am inclined to give you the position if you understand double-entry keeping.

Applicant: I do indeed! At my last place I had to do a triple-double-entry—a set for active partner, showing the real profits, a set for the sleeping partner, showing small profits, and a set for the Income Tax officials, showing no profits.—*Warner American News.*

A lawyer pleading his first case against a railroad for killing twenty-four hogs: "Twenty-four, gentlemen of the jury, twenty-four. Twice the number in the jury box." —*The Southwestern Bulletin.*

When Business Is Safe

WHEN you shake hands with your competitor and mean it—when you can work hard in your business and love it—then your business is safe.

When you advertise service and give it—when you can build reputation and keep it—then business is safe.

When you can accept wise counsel and heed it—when you agree to a standard and stick to it—then business is safe.

When you see more of associations than luncheons—when you give more to associations than money—then business is safe.

When you join your association and attend it—when you believe in the association and boost it—then business is safe.

When you can establish confidence and maintain it—when you can recognize doubt and destroy it—then business is safe.

When you can aim for success and attain it—when you can attack failure and defeat it—then business is safe.

When you can sense competition and not knock it—when you can fight competition and still boost it—then business is safe.

When you can recognize wrong and combat it—when you can believe in a right and can shout it—then business is safe.

When you can meet opportunity and know it—when you can make an admission and forget it—then business is safe.

When you strive for an ideal and can live it—and aim for what is right and then pray for it—then business is safe.—Pacific Fountain Trade.

Too Much for Maggie

A canvasser for a magazine house walked to the door of a prospect and knocked. A colored maid answered.

Canvasser: "Is the lady of the house in?"

Maid: "She's takin' a bath, suh!"

Canvasser: "I'd like to see her."

Maid (grinning): "I'se speck you would, white man."—*Hercules Record.*

No Epidemic Expected

Bobby was absent one day from school and his teacher asked him what the matter was.

"Mamma's sick," he said. The teacher told him to go home and see if it was catching. So little Bobbie trotted home and asked his mother, for if it was catching they would have to keep him out of school.

"No, Bobby, it isn't catching," his mother said. "The stork has brought you a little sister. You can tell your teacher there isn't any danger of her being quarantined."—*Rockland-Rockport Lime Bulletin.*

Whose?

There is an interesting road sign near Clearwater, Florida, evidently designed for earth moving contractors. It reads as follows:

"Beware of soft shoulders."—*The Graham Rock-It.*

Quarry Man's Daughter?

"So you married my daughter, thinking I'd pave the way for you in business. Is that it?"

"Well—er—not exactly. I'll do the paving, but I thought you might furnish the rocks."

Missouri Submarine

Mud seas engulfed the unpaved streets of a certain Missouri oil town.

Looking out of his front window a resident espied a hat apparently floating along on a sea of mud which a few days before had been a highway. Going out to investigate he discovered that the hat belonged to a negro—in fact, that it was on the head of the owner who was having difficulty in keeping his nose and mouth above the surface.

"Hey, nigger, you're in a bad fix out thar ain't you?"

"Wal, boss, I ain't bragging, but—I ain't in no whar nigh as bad a fix as dis heah mule I'se riding."—*The Earth Mover.*

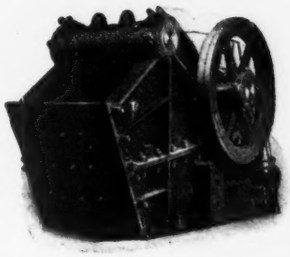
Crushing Plant Equipment

The many crushing plants which have been completely equipped by the Allis-Chalmers Manufacturing Company is evidenced by the satisfactory service which these plants are giving. The Allis-Chalmers Manufacturing Company takes the entire ***responsibility*** for the design of the plant and its equipment. These plants are built on the highest engineering standard following the best engineering practices.

Our Engineers are at your service to make complete installation drawings

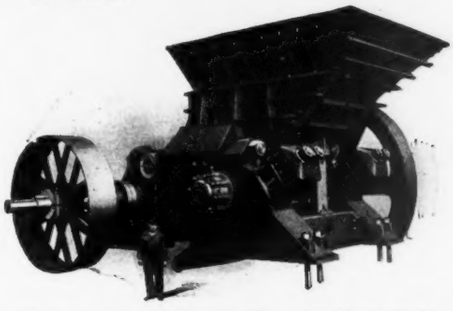
Gates No. 27 Gyratory Crusher, having two openings, each 54 in. x 141 in.

The Gates Style N Crusher, which has been developed in all sizes, is the result of 40 years' accumulated experience of the engineers and designers of the Gates Iron Works and the Allis-Chalmers Mfg. Co.



Jaw Crusher

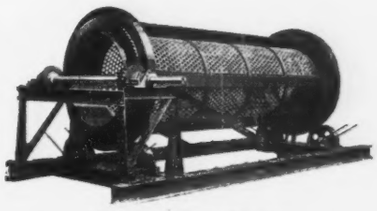
The company has also developed in all sizes Jaw Crushers for crushing copper ore, blast furnace flux and ballast stone.



60 in. x 48 in. Fairmount Type (or Single Roll) Crusher

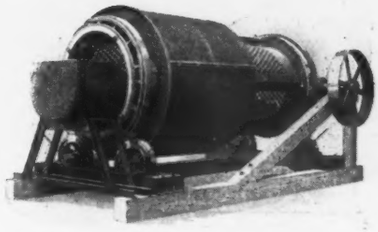
The Fairmount Crusher is intended to crush limestone, dolomite, phosphate rock, magnesite and other less tenacious rocks. It is not suitable for, nor do we recommend it for granites, trap rock or other igneous rock.

The durability, simplicity and efficiency of the Gates Patented All-Iron Frame Screens is unequalled by any other screen on the market.

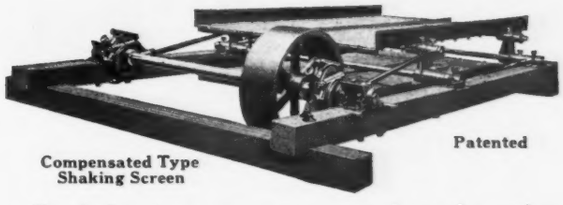


All Iron Frame Screen

Gates Screens are built in numerous sizes, ranging from 24-in. diameter by 8 ft. long, to 72 in. diameter by 24 ft. long. Open End Scalping Screens of the Cylindrical type are built in sizes ranging from 48 in. to 72 in. diameter.



Style "B" Open End Revolving Screen



Compensated Type Shaking Screen

Patented

By balancing one screen against the other, much of the vibration in the frame and building is eliminated. Up-to-date commercial limestone and gravel plants realize the vital importance of installing shaking screens permitting the production of smaller stones to meet the market requirements.

Write for Our Bulletins

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS MANUFACTURING COMPANY

MILWAUKEE, WISCONSIN, U.S.A.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

News of All the Industry

Incorporations

Copemish Gravel Co., Lansing, Mich., $100,000.

U. S. Lime and Cement Corp., Dover, Del., $2,500,000. (U. S. Corp. Co.)

Green-Hart, Inc., Franklintown, La., $10,000. Sand, etc. George F. Hart and W. Green.

Huntsville Stone and Crusher Co., Huntsville, Tex., increasing capital stock from $80,000 to $100,000.

Monolithic Concrete Construction Co., 101 East Fayette street, Baltimore, Md. E. H. Frost and D. H. Rose.

Consolidated Crushed Stone Corp., Kansas City, Mo., $100,000. Wingate Bixby, 5105 Wyandotte street, R. L. White.

Tide Water Trap Rock Co., Inc., N. Y. county, quarry trap rock, etc., $500,000. A. E. Moore, 37 Wall street, New York.

Avondale Stone Products Corp., Baltimore, Md., $200,000. To deal in limestone, etc. Adolph Meyer, Baltimore, S. N. Jarvis.

Adirondack Feldspar Corp., Albany, N. Y., $300,000. R. C. Poskanzer, J. Illch, M. M. Medwin. (Attorneys, Muhlfelder and Illch, Albany.)

Coal River Sand Co., Big Coal, W. Va., $25,000. I. E. Chilton, 1108 Virginia street, Charleston; Henry W. DePue, Big Coal; operation at both Grippe and Big Coal.

Virginia-Carolina Soapstone Corp., Roanoke, Va., $50,000. C. M. Armes, president, Payne building; J. A. Jamison, secretary-treasurer and general manager, P. O. Box 405, and others.

Krystol Rox Stucco, Inc., Lake Alfred, Fla., Charles W. Shinn, Buena Vista drive, secretary. Will establish plant to manufacture stucco, with capacity of 50 tons per day. Will install sand dryer.

Rival Sand and Gravel Corp., Cedar Manor, Jamaica, N. Y., $5000. P. J and J. Modawick, 1 Meyer avenue, Cedar Manor, P. Tulle. (Attorney, A. Herzog, Jamaica).

Sand and Gravel

Middleton Reed, proprietor of a stone quarry at St. Helens, Ore., died there recently.

Bakersfield Rock and Gravel Co., Bakersfield, Calif., has selected J. R. Hughes as plant manager.

Nampa, Idaho, city commissioners have leased a sand and gravel pit near the city to obtain a supply for their streets.

Illinois Central railroad gravel pit at Cherokee, Iowa, furnished over 80,000 cu. yd. of ballast during the present season.

Koch Sand and Gravel Co., Evansville, Ind., are operating their entire dredge fleet at the Mt. Vernon, Ind., plant on the Ohio river.

Cleveland Stone Co., Cleveland, Ohio, C. W. Walters, president, has let the contract for a stone mill in Amherst, Ohio, to cost about $100,000.

Grand River Gravel Co., Fort Gibson, Okla., T. I. Langtry, manager, 1614 S. Cheyenne street, Tulsa, will erect a gravel producing plant to cost $20,000.

O. P. Beyers, Hutchinson, Kans., has contracted to supply the Santa Fe Railroad Co., with 200 carloads of gravel from the gravel beds of the Wichita Northwestern railroad at Pratt county, Kans.

Atlas Rock Co., Oakdale, Calif., has closed down for a couple of weeks, so the equipment can be overhauled before starting to fill the Melones dam contract for 200,000 tons of rack, gravel and sand.

Lebanon Sand Co., Lebanon, Penn., has been sold by D. Greiner to H. E. Swaltz of Lebanon. The plant employs seven men and operates several trucks to take care of the daily output of 60 tons of building sand.

General Contracting Corp., Columbia building, Pittsburgh, Penn., has preliminary plans for a sand and gravel plant near the foot of 20th street, East Liverpool, Ohio, with screening, loading and other distributing machinery, to cost $75,000 with equipment. B. B. Byers is president.

Texas Sand and Gravel Co.'s Waco, Texas, new plant on the Colorado river, near Colorado, Texas (details of construction in August issue, p. 70), is almost completed. Work is progressing rapidly on the assembling of the plant machinery and the two derricks. Daily capacity is expected to be about 20 cars of material.

Randolph Sand and Gravel Products Co., Randolph, Minn., has been placed in the hands of a receiver. The receivership order was filed by the district court upon the appeal of J. A. A. Burnquist, who stated that out of the authorized issue of $100,000 stock, only $44,000 worth had been sold. The company had a plant at Randolph which had not been operated last year.

Lime

Abramson and Body Corp.'s plant at Lindsay, Calif., has started shipments of lime. The lime plant is one of the units in the entire project which will include a cement mill and fertilizer plant.

Limestone

T. F. Moffatt, of Stephens county, Texas, has purchased eight acres of land near Littlefield, Texas, on which he will install two rock crushers, and plant. The site is located on the Santa Fe railroad.

Limestone shipments by water on the Great Lakes were very heavy during the present season. Gary, Ind., harbor received 71 boats holding 733,826 tons of limestone, most of which was for the U. S. Steel Corp.

Lake Erie Limestone Co., Youngstown, Ohio, will build by separate contracts a one-story, 35x60-ft. new crushing and loading plant to cost $85,000 at their Hillsville, Penn., properties. Allis-Chalmers Co., West Allis, Wis., are the engineers.

Cement

Warrior Cement Corp., Chattanooga, Tenn., has appointed Paul Steward as sales manager. G. F Davenport is assistant sales manager.

American Clay and Cement Corp., Rochester, N. Y., have purchased 2½ acres of land and propose to erect a $75,000 warehouse on the site. The new warehouse will have a 600 ft. frontage on the New York Central railroad.

Petoskey Portland Cement Co., Petoskey, Mich., has plans under way for the doubling of storage capacity. Burrell Engineering and Construction Co. of Chicago, are reported to have obtained contract for erection.

Louisville Portland Cement Co., Louisville, Ky., have awarded contract to Burrell Engineering and Construction Co. of Chicago for the erection of 4 storage bins for cement and 2 storage bins for "Brixment" for their Speed, Ind., plant.

Sandusky Cement Co., Sandusky, Ohio, is to double its storage capacity. Construction work is by Burrell Engineering and Construction Co. of Chicago.

Atlas Portland Cement Co., New York, are installing at their Leeds, Ala., plant by their own forces a kiln purchased from the Vulcan Iron Works, Wilkesbarre, Penn., several Fuller mills, and all necessary conveyors and equipment.

Cement Products

Washington Cinder Block Co., Alexandria, Va., plant has been damaged by fire to extent of about $25,000.

Beck Art Stone Co., Huntington Park, Calif., have purchased property adjoining their plant on which new additions will be erected.

Everlastone Products Corp., Baltimore, Md., manufacturers of stucco and cast cement specialties, have purchased property at Belmont avenue and Cemetery lane as a site for a new plant.

Howe Cement Works, Kennewick, Wash., have been destroyed by fire. Loss was partially covered by insurance. The company has already ordered new machinery and continued operation in a new factory.

Federal Cement Tile Co., Chicago, Ill., has established a new branch sales office at Indianapolis, Ind., under the direction of C. B. Baird, who for many years has been affiliated with the company in various capacities.

Quarries

Brandon Rock Products Corp., Brandon, Vt., has enlarged its plant for the second time this present year in order to take care of increased orders for stucco chips and terrazzo.

Magnesite

Asbestoloid Products Co., Kalamazoo, Mich., manufacturers of magnesia flooring composition, plaster, stucco and other magnesite products, reports good volume of business. Business for the past fiscal year totalled over $50,000 on an invested capital of $21,000. C. F. Butman is president and L. C. Knou a member of the firm.

Feldspar

North State Feldspar Co., of Micaville, N. C. will add a grinding unit and accessory equipment as well as a steam power plant.

Hammill and Gillespie, Inc., 240-42 Front street, New York, producer of clays, feldspar, flint, etc., has begun the erection of its proposed mill for grinding, sorting, loading, etc., at Carteret, N. J., to be 60x200 ft. Contract for the building has been let to the Standard Erecting Co., New York.

Potash

German Potash Syndicate reported sales of potash for the first seven months of 1925 to be 829,270 tons, in comparison with the same period in 1924 of 374,805 tons.

Silica Sand

Diatomaceous Products Co., Inc., Dunkirk, Md., H. H. Sheets, secretary, 204 Southern building, Washington, D. C., has acquired a steel mill building; will install machinery for development of diatomaceous silica deposits.

Slate

Colonial Slate Co., Bangor, Penn., lost a portion of their plant at Wind Gap, Penn., and equipment valued at $50,000, through fire recently. Plans for rebuilding are under way.

Manufacturers

Brown Instrument Co., Philadelphia, Penn., announce the opening of an office at 215 E. New York street, Indianapolis, Ind., with I. R. Green in charge and an office at 1108 Hippodrome building, Cleveland, Ohio, with G. S. Frazee in charge.

Smith Engineering Works, Milwaukee, Wis., manufacturers of handling machinery, will occupy their new plant on Lake boulevard after November 15. The new plant is of modern fireproof construction, 244 ft. 8 in. by 195 ft. and is situated on a 6-acre tract. In addition to the machine shop and heating plant, the new plant has a steel pattern warehouse and steel garage buildings and excellent side track connections with railroads. The plant is equipped with five Pawling and Harnischfeger cranes of latest design.

Climax Engineering Co., Clinton, Iowa, announce the appointment of the Coast Machinery Corp., 829 Folsom street, San Francisco, Calif., as sales representatives for California. Edward Crowley, former general sales manager of the Climax company, is president of the Coast Machinery Co. A stock of repairs and units sufficient to take care of requirements will be carried at San Francisco. The following new dealers for Climax

Any Jury of Twelve Practical Producers

IMPANEL a "jury" of practical lime producers, and get the verdict of those who really know. Place this question:

> "Will a better lime plant result if all responsibility, from contracting and engineering to the installation of equipment, is placed under centralized control—if the complete service of a great company is given all responsibility?"

You know in advance what the verdict will be!

Here in Woodville, in the heart of the world's lime center, we have the opportunity of contact with many a "jury" of this kind. From their opinions, and from our own experience, we have learned the value of a complete service in building modern lime plants.

If you would like to know more about the value of such a service to you, write us.

ARNOLD & WEIGEL

Contractors & Engineers

Woodville, Ohio

"Trustworthy" engines are also announced: George W. Whitehead Co., 61, The Terrace, Buffalo, N. Y., is handling engine sales in Buffalo and western New York. Edward C. Dingman, 1005 Keefer building, Montreal, Canada, for Montreal and the vicinity, while Harvard Turnbull and Co., Ltd., 912 Excelsior Life building, Toronto, are sales representatives in Ontario. Advance Contractor Repair Co., 1332 W. Lake street, Chicago, Ill., is the new agent for the Chicago territory. They will also maintain a service station and carry a supply of parts for the benefit of Climax users in their territory. Mine and Smelter Supply Co., 121 W. Second street, Salt Lake City, Utah, are agents for the sale of Climax engines in Utah. McDonald and Burgman, Jacksonville, Fla., official parts and service station. The new service organization will carry a line of replacement parts for the four-cylinder Climax engine, 5½-in. bore by 6-in. stroke, known as the "T" series engines.

Trade Literature

NOTICE — Any publications mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of these items kindly mention ROCK PRODUCTS.

Truck and Trailer Cranes. Bulletin No. 635-X, illustrating and describing truck and trailer cranes. Features great mobility, light and sturdy construction and speed. Contains brief specifications and construction diagram. 8½x11 in. 8 pp. **Harnischfeger Corp., Milwaukee, Wis.**

Electric Vibrating Screens. Bulletin describing Mitchell electric vibrating screens for use in rock products industry. Contains illustrations and complete data on uses and construction. Specifications, plans, diagrams, etc. 6x9 in. 28 pp. **C. W. Hunt Co., Inc., West New Brighton, N. Y.**

Portable Hoists. Bulletin No. 76F, illustrating and describing compressed air portable hoists of single drum, class HA-3, class HA-2, single drum with higher drum flanges, and double drum, class HDA-2 type. Describes uses in erection work, unloading and pulling loaded cars. Mentions briefly steam turbine hoists. Specifications, etc. 6x9 in. 16 pp. **Sullivan Machinery Co., Chicago, Ill.**

Rock Drills and Mining Machinery, Bulletin No. 100, 101, 102, 103, featuring hand held and mounted rock drills, drill setaoincmfwypetaoin plings, fittings, and automatic heat treating machines for rock drill bits. Contain complete illustrations, description, and specifications along with interesting data on rock drilling operation. 92 pp., 6x9 in. (Loose leaf form.) **Gilman Mfg. Co., East Boston, Mass.**

National Fire Protective Association, Boston, Mass., have issued pamphlets and booklets on steps to be taken in prevention of fire hazards in home and factory. Bulletins contain the regulations of the National Board of Fire Underwriters for electric railway car houses and cars and those for electric wiring and apparatus. Of especial interest is the data dealing with precaution against freezing of fire extinguishing apparatus.

Philadelphia Gear Works, Philadelphia, Penn., manufacturers of gears and speed reducing units, have just issued a four-page bulletin No. 10-25, regarding their latest types of worm gear and spur gear speed reducers. This bulletin briefly describes and illustrates the units and features a few actual installation views.

Diesel Engines. Bulletin No. 33 illustrating type "KD," heavy-duty Diesel engine. Design shows no radical departures from the type "K," but has been somewhat simplified. Features ignition system that allows immediate start from cold. Contains complete description and details, data, etc. ANDERSON ENGINE AND FOUNDRY CO., Anderson, Ind.

Excavators. Bulletin No. 4752 featuring Ruston No. 6 general purpose excavator fitted with ⅞-cu. yd. bucket adaptable for use as a crane navvy, dragline crane, trench excavator, pile driver, etc. Illustrations and description of excavator. Contains complete specifications and plans. 34 pp. 7x9¾ in.

Bulletin No. 4672 illustrating and describing dragline excavators for stripping, excavatian, sand and gravel pit work, etc. Details of operation, specifications and plans. 32 pp. 7x9¾ in.

Bulletin No. 4796. Illustrating and describing electrically operated excavators for use with either a.c. or d.c. General description of equipment and mode of operation. 12 pp. 7x9¾ in.

These bulletins are all handsomely illustrated in sepia half tones and well printed. RUSTON AND HORNSBY, LTD., 15 Kingsway, W. C. 2, London, England.

Fans. Bulletin No. 6103 illustrating and describing the American H.S. fan developed for building ventilation. Contains specification sheets which describe and illustrate various parts of the fan, table of standard arrangements, capacity tables and dimension sheets in detail. 32 pp. 8½x11 in. AMERICAN BLOWER CO., Detroit, Mich.

Cements Products Machinery. Interesting little booklet called the "Idealist," giving a few pointers to cement products manufacturers on the retailing of their product. Illustrates power stripper and molds for cement products. THE IDEAL CONCRETE MACHINERY CO., Cincinnati, Ohio.

Carbon Circuit Breakers. Bulletin No. 1705-A describing and illustrating type CL carbon current breakers. Outline of important characteristics such as adjustments, use of overload attachments, etc. Features especial use of breakers for 250-volt industrial application. 24 pp. 8½x11 in. WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., East Pittsburgh, Pa.

Impact Pulverizers. A brief illustrative description of Raymond Imp mill with operating data and interesting uses of this type. Features use in grinding slate and asbestos tailings. 4 pp. 8½x11 in. RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill.

CO_2 Recorders and Indicators. Bulletins No. 118 and 118A, illustrating and completely describing Apex recorders and indicators. Feature operation on the orifice principle. UEHLING INSTRUMENT CO., Paterson, N. J.

Personals

George P. Longwell, former vice-president in charge of sand and gravel production of the Consumers Co. of Chicago, died recently at his home at Oak Park, Ill. He had been exceedingly active in Masonic circles and was a past commander of Columbia Commandery and assistant rabban of the Medinah temple. He is survived by his widow, two sons and three daughters.

Wolf Kritchevsky, D.Sc., has opened a testing and research laboratory at 204 S. Peoria street, Chicago, at which he will carry on extensive work on lime, cement, gypsum, etc. Dr. Kritchevsky, is a man of wide experience in the industrial chemistry field, having served for two years as chief chemist to the Sherwin-Williams Co., and during the past six years has been technical director of the Sunbeam Chemical Co. Associated with him in his new undertaking is Carl J. Beckert, a graduate chemist from Ohio State, who will be in direct charge of all the laboratory work. Previous to entering the industrial chemistry field, Mr. Beckert was chief chemist for the Ohio Enamel Co. and assistant chief chemist of the Barrett Co.'s research and testing laboratory.